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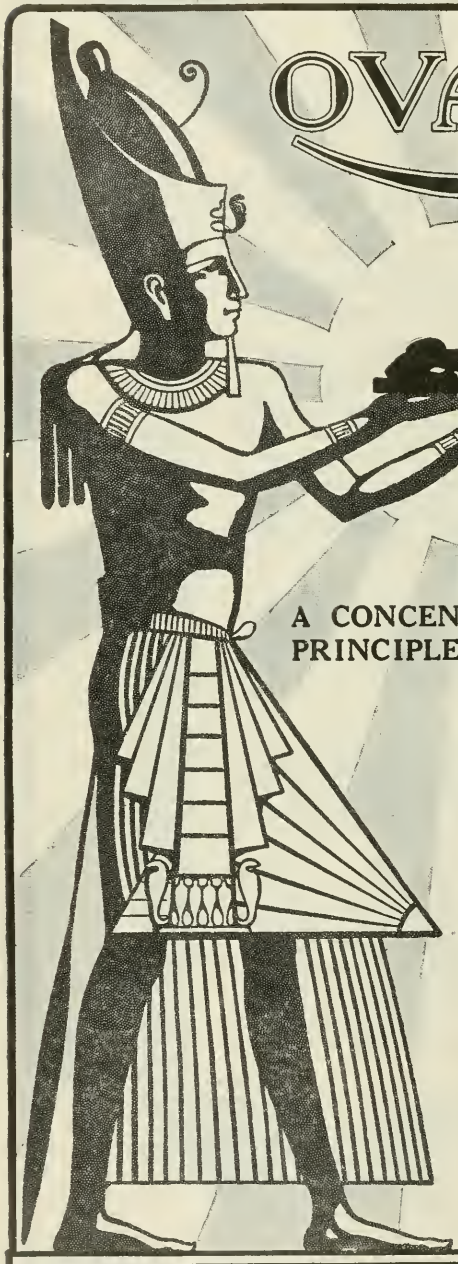

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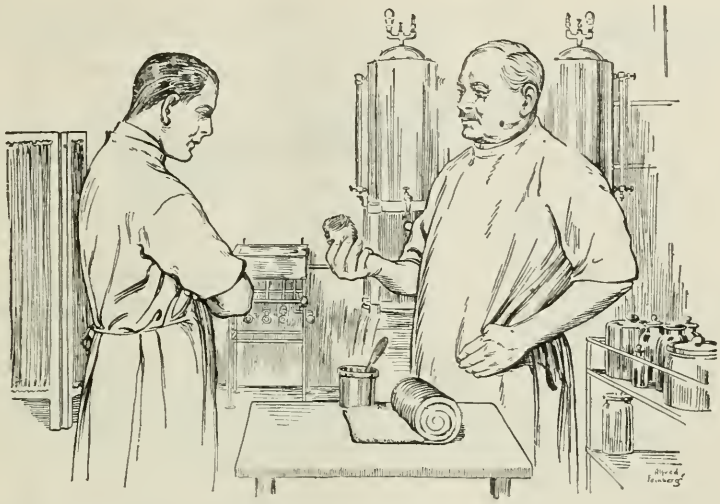

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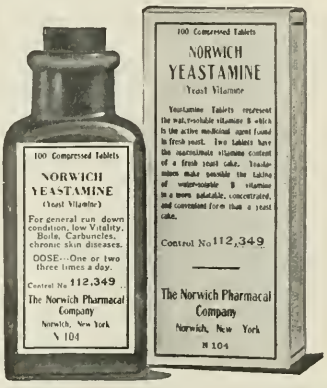

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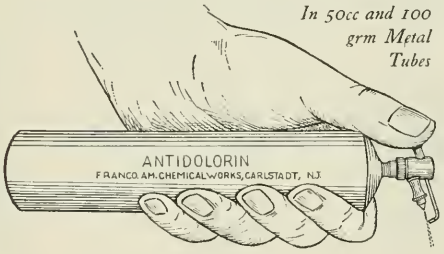

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VOL. CXV, No. 10 NEW YORK, WEDNESDAY, MAY 17, 1922. WHOLE No. 2233

A Contribution to the Etiology of Feeblemindedness with Special Reference to Prenatal Enamel Defects*

By L. PIERCE CLARK, M.D.,
and CHARLES E. ATWOOD, M.D.,
New York.

Many eugenists, some medically trained and others but psychologically skilled, have advanced a theory that mental defect is an hereditary disease. Such investigators hold that mental defectives beget mental defectives in a fairly large percentage of instances, about seventy per cent. in all material studied. Autopsy findings not ordinarily encountered as a sequence to transmissional neural defects have cast some doubts upon the scientific accuracy of the hereditary view. Histopathological lesions on the whole have been of a distinctly inflammatory or hemorrhagic nature. These autopsy findings and the hereditary germ plasm defect theory need to be harmonized if we are to arrive at a just evaluation of the several causes of feeblemindedness.

It becomes an increasingly difficult task to apportion the precise rôle which the various factors play in the etiology of feeblemindedness. If we might postulate defective stock (and that only in a given case), the matter would be simple; but the picture is often complicated by the vicious presence of alcohol and venery in the ascendants, a prenatal history of extreme malnutrition, or a maternal infective fever and an irregular parturition. So we must apportion the etiology as best we may. The issue is not alone of eugenic importance, but has far reaching social and medical values. Many parents bring their mentally defective children to the consultant to ask whether additional offspring may be similarly afflicted. If the physician is fairly able to apportion the etiological factors, the parents may be much relieved in consequence. In brief, it adds to the specificity of diagnosis. Educational training in developmental therapeutics is also at stake. As regards the latter, hardly any neurologist would pretend to have much hope of a radical betterment in the hereditarily feebleminded; but he might entertain a much different prognosis for inflamed or damaged brain structures not handicapped by inheritance. Psychasthenists are signally at fault in their nonvariant treatment of the two kinds of feebleminded etiologically classified. It may be just possible, on the other hand, that the acquired feeblemindedness may be of a more severe grade and more handicapped by inflammatory or hemorrhagic processes; even so, it cannot be gainsaid that the manner of therapeutic approach in the two types should be different at different stages of the training treatment. We think an expression of opinion upon this point by neurologists and psychiatrists might be worthy of the attention of those specifically concerned in the training of the feebleminded.

THE HEREDITY FACTOR VS. INTRAVASCULAR LESIONS, ENDOCRINE INSUFFICIENCY AND OTHER FACTORS.

There is a consensus of evidence that children with varying degrees of defective mentality spring from stock tainted with neuropathy. This latter term, used in its most divergent sense, includes mental defects, psychoses, psychoneuroses, and even tics and neuroses. Moreover, some would include all cases of organic brain disease, while others would not omit criminal and antisocial impulses and eccentricity, including marked defects of character, offset or not by unusual gifts. By including every possible element which might be listed under the term "neurotic ancestry," and by limiting the inheritance to one or a few near relatives, it is possible to increase to a very high mark the percentage of heredity thus understood. The degree of elasticity granted to the ancestry is also permissible in the descendant. He himself may range from extreme idiocy to the type of mental defect which is appreciable only by delicate psychometric tests.

Many attempts have been made to standardize heredity and to classify its different types. The material may be limited to the idiot and the dependent imbecile, leaving out the moron and debile;

*Read before the New York Psychiatrical Society, December 7, 1921.

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while the heredity may be limited to the cases of mental defect in the ancestry, or there may be the requirements of crossed neuropathic heredity or a minimum number of cases of neuropathy in the ascendants. In this way the heredity percentages may be cut down to a given number, as twenty-five or even less. Individual experience may be out of all harmony with averages. Thus one authority, Douglas Hunter, asserts that he has yet to see a case of mental defect in which one or both parents did not show departure of some kind from the normal. This experience, however, is extremely unusual.

The statistical method as pursued by the eugenists may be open to criticism. The professed statistician is very critical of the work of all amateurs, however great their prestige and experience. The former would doubtless point out that while one ascendant, direct or collateral, may have one weakminded child, this child may not have been born until after the birth of many normal children. Another ascendant may have begotten or given birth to only one or two children. How can any material include such discordant members? Who can say that if a couple could procreate a sufficient number of children, that one of these might not exhibit some degree of mental defect? If the inheritance of the latter is Mendelian, it could hardly be expected to crop out unless the ascendants had a certain degree of fertility.

The statement has been made that mental defect never appears in sound stock as a mere sport. There is no way of making good this axiom. No one denies that mental defect may be due to some intravascular lesion which may date back much farther than parturition and in fact as far back as the embryonal period. There is no way in which this last statement can be disproved. In regard to the mooted question of the effects on the mentality of the child of protracted labor, forceps cases and asphyxia neonatorum, statistics show the greatest discrepancies—from four and even less to as high as thirty-three or more, a convenient average being eighteen. Naturally the lower figures given are not higher than those of controls, while some of the higher seem considerably superior to control material. But if we follow Weygandt we shall abandon the attempt to prove by figures that difficult labor is a notable factor in the genesis of mental defect. To have produced mental defect it should be necessary for labor to set up some definite intravascular process—hemorrhage, thrombosis, or other condition. In order to determine the presence of actual lesions, autopsies on defectives would have to be invoked. In this province we find only a statement that about twenty per cent. of the lesions found in these subjects are of intravascular origin while the rest are agenesic. Such figures can apply only to gross lesions, presumably in the more marked types. We have no data as to microscopic lesions, nor to defectives in whom no alterations can be brought to light. The difficulty of interpreting minimal lesions is well known and it is doubtful whether a consensus of opinion could be reached. Certainly in theory, intravascular lesions can give rise to agenesia. The claim is made that porencephaly itself may be of inflammatory origin although there is a compromise view which maintains the existence of an inflammatory pseudoporencephaly which is quite distinct from the agenesic type.

In theory all mental defect which is purely inherited should be agenesic, while if the germ plasm was intact in the fecundated ovum the mental defect must be attributed to intravascular lesions due to traumatism or infection. Such a causal factor present in the embryological or early fetal period should itself be able to cause arrested development. The prospect of dissociating the two components in the individual case, and in defectives as a class, is therefore dubious. The true function of the practical eugenist is to prevent the marriage of mental defectives for the reason that such individuals have the tendency to procreate their kind. But after the defective is once born and recognized it does not seem to lead anywhere if we show that he is born of a tainted family. Even if this is true there is no way to be sure that his defect is not due to something accidental. The record of a few cases of accidental defect in a family could unjustly taint the whole stock.

Some writers on mental defect refuse to commit themselves to making any distinction between antepartum and intrapartum origin on the one hand, and postnatal origin on the other. During early extrauterine life some accidental factor—a trauma or infection—may have been sufficient to cause an actual intracranial lesion. A certain amount of backwardness in the early months is no criterion of future mental defect. Doubtless in not a few cases of alleged congenital or inherited defect the mischief is postnatal, although the converse is more apt to be the case and masked or ignored heredity may be set down to falls or infantile convulsions.

In theory the presence of stigmata of degeneration should be of extreme value in segregating the inherited case from the acquired. The percentage of stigmata in mental defect corresponds closely to the percentage of neuropathic heredity. But a close comparison will show that the two percentages cannot be superposed. Goddard concedes that the high grade imbecile and moron are often quite free from stigmata of degeneration. From another angle the socalled stigmata may not be a coexpression of some arrest of neuronal development. Some of them, at least, are sufficiently explained by intrauterine pathology. The same unknown intravascular processes which interfere with the development of the nervous centres may conceivably affect other somatic structures.

But the inherited and congenital factors in mental defect may be visualized in a different way. In place of a blanketlike inheritance special factors may be studied, and especially two—alcohol and syphilis. Both these race poisons may act originally on the germ plasm, or the latter may have been normal and the action may not be exerted until the period of gestation when the mother may contract the disease or alcoholic habit. Moreover, either of these factors may be superadded to a general neurotic inheritance. Mental defect from alcoholism in the ascendants is a clean cut issue which has a foundation in animal experiment. The progeny of alcoholic ancestors shows a highly polyvalent inheritance which comprises everything under neuropathy, degenera-

tion, physical inferiority, and other pathological conditions. It is impossible to show whether the neuropathic children of a man addicted to alcohol owe their neuropathy to the sire, or to the germ plasm which he himself hands down. His own alcoholism may have been an effect rather than a cause. Since it is usually the father who is alcoholic, the entire question of parental inheritance comes up. In Stockard's experiments on guineapigs some dealt with paternal transmission, the females being intact. In one set of experiments the males were made to inhale alcohol fumes. As a rule the members of the second generation were slightly smaller and nervous as compared with controls. The mischief was not apparent, however, until members of the second generation were bred together and bred with sound mates. The proportion of still births showed an increase, but the most striking effect seems to have been an arrested development of some of the tissues of the eyes—opaque cornea, cataract, and in some cases complete or partial failure of the eye to develop at all. When breeding of defectives was continued, the third generation in some cases showed not only an ophthalmos but even the eyelids were defective. A possible fallacy is associated with the fact that the eyes and eyelids in the first generation suffer considerable traumatism from contact with the alcohol fumes. Stockard, however, has satisfied himself that this accident is not in itself transmissible and that there is some selective action of the alcohol on the *anlage* of the eye. Apparently this behavior of the ocular structures is specific and has not been known to appear either spontaneously or after experiment with other substances—at least none is mentioned. The sex of transmission may be male or female.

The subject of alcoholic inheritance is susceptible of illogical interpretation. Thus the mere fact that one parent is not an abstainer has been made a criterion in statistics intended for prohibition propaganda. The belief in the potency of alcohol in this respect prevails among the laity to some extent. Several leading authorities have data to show that the moderate use of alcohol does not injure the germ plasm. Goddard states that of the alleged cases of alcoholic ascendants in the Vineland material all presented some other factor which sufficiently explained mental defect in the offspring. If there is actually a history of excessive parental drinking there are twice as many feebleminded in the descendants as in nonalcoholic controls. The entire problem is subject to the criticism that the drinking or drunken progenitor may have used alcohol because he was a neurotic or psychopathic. It is a matter for ready verification that while the children of one drunken parent, as in the Jukes family, may beget a progeny containing many defectives, the progeny of another drunkard may exhibit no taint of the sort. At one period the subject of paternal heredity was left open, but it was stated that maternal and crossed inheritance was very apt to produce defective children; while if the mother was a habitual drunkard, drunk at conception and through gestation, the infant could hardly fail to be structurally damaged. The fact must not be overlooked that a drunken mother can expose the unborn or newborn infant to ordinary traumatisms. She may undergo severe injuries while intoxicated, her resistance to infections is weakened, she is more likely to suffer from hemorrhage, and other conditions. But alcoholic gravidæ show no special tendency to abortion although still birth is more common than in controls. We find the general statement that alcoholic mothers produce undersized and sickly children who are predisposed to disease.

That alcohol engenders any particular type of mental defect in the progeny of drunkards, or has any special mechanism, is far from true. In these children we may see all forms of idiocy, imbecility, neuropathy, and degeneracy. Hydrocephalus cases are found and epilepsy is especially common among them. The accidents attributable to alcohol run the same gamut as those in families without alcoholic abuse in which simple heredity is accused.

In order to appreciate the difficulties of isolating the agenesic from the accidental factor, the condition microcephalus would seem in theory to be essentially one of arrested development. Weygandt points out, however, that this condition can be the result of encephalitic processes. This was shown by Stark as far back as 1875. The agencies which directly injure the germ plasm and in theory induce arrested development are the very ones which lower the resistance to germ infection; and as long as this is the truth it will be difficult if not impossible to distinguish between the results of agenesis and intravascular mischief. We must think both of an agenesic microcephalus and an encephalitic type.

In anencephalus fetuses, where the cerebrum is rudimentary, the mechanism is not a refusal to develop, but the operation of such general factors as hydrocephalic pressure and amniotic adhesions. Weygandt points this out in the attempt of Hammarberg to differentiate between the different grades of idiocy and imbecility by the period of arrested development of the cortex, that the plates show plainly the evidences of past encephalitis. The microgyry of authors, an alleged agenesic defect, has been shown to depend on encephalitis and meningitis.

In the celebrated Becker family of microcephalus children there was nothing in the ancestry to illuminate the phenomenon. Of nine children, five were microcephalic; three who grew up were idiots. Here one might feel sure of endogenous defect but in at least one case there were inflammatory alterations. There was a possible clue to the mechanism in these cases which is not found in literature. In the fourth month of the microcephalus gestations the mother had invariably been very restless. It is suggested that some toxic principle generated by the mother—and possibly akin to those which cause the various toxemias of pregnancy—may have been formed which was prejudicial to fetal development. Pilcz reported a family which comprised four microcephalic boys and six hydrocephalic girls. One of the latter grew up and gave birth to four children with mental defect.

To render the subject more confusing there have been individuals of normal mentality with defective brain structure.

If we eliminate the familiar types of mental de-

fect with selfevident gross lesions a study of the other clinical forms should be instructive. The subject with mongolism presents striking somatic changes. The structure of the brain is in part agenesic, the convolutions being of the embryonal type with histological departures, but Bourneville reports a case with meningoencephalitic adhesions. Weygandt is not sure that mongolism is not primarily a dysglandular infantilism. This view would place the blame for arrested development on the endocrine glands. The brain development is said to resemble closely that of myxedema and cretinism. Weygandt therefore creates a large family of glandular infantilisms in which presumably there is an infantilism in the cortical development. In such cases intravascular lesions, traumatism, infection, etc., as well as neuropathic inheritance should recede into the background.

The rôle of syphilis in the production of mental defect involves, like alcoholism, a special form of hereditary transmission and special mechanisms. The small percentage of Wassermanns in asylums is evidence that as a direct infection the disease plays no great rôle. A positive Wassermann of itself is insufficient to enable us to speak of syphilitic mental defect. But aside from this, syphilis often is responsible for infantilism and arrested development.

To sum up, the admission that in mental defect there is a notable percentage of neuropathic cases in the ascendants throws no light on the mechanism involved. It does not exclude the possibility that in the individual case the mechanism is toxiinfectious or traumatic. The hereditary component may be quite unlike what we suppose. The belief in an underlying arrest of development cannot be visualized. We can understand a secondary arrest but not a primary one. The greater the defect as in anencephalus the greater the likelihood of an exogenic factor. At the present day we can only visualize arrested development in the simple sense of the word as an infantilism of the brain in which the mechanism is endocrinous. In addition there is the possibility, hardly as yet agitated, that something akin to growth vitamines may be lacking from the nutriment. Some of the aminoacids formed by digestion are known to be more than foods—they are necessary to growth and development. The infant must depend wholly on the maternal organism for its vitamines and other growth determinants. The date at which it begins to manufacture its own hormones is probably not known, but at the outset of gestation these, too, must be of maternal origin. Again, the pregnant woman is known to manufacture substances which may be highly toxic to herself and presumably some of these may be toxic to the fetus and inhibit its development. These metabolic anomalies may be transmissible by heredity. It would seem that the future would have to take more cognizance of this element in the causation of mental defect. Bullard found a surprisingly high percentage of intrauterine disease in the mothers of his mental defectives.

In the study of accidental causation it is especially difficult to assess the rôle which the fetal intrauterine life plays in the amential picture. Gross lesions have been fairly worked out by a host of workers including Kundrat, Heschl, Strümpel, Féré, Bourneville, and others. But the more vague and insidious alterations in the developing fetal brain induced by nutritional disturbances which the mother suffers during gestation have not been properly approached. Of late the experimental induction of transmissible brain defects has opened the question whether the defective germ plasm theory is the correct one for even a large number of the feebleminded. The work of Stockard and others are instances in point. The following excerpts are from an article by Stockard appearing in January of last year, which bear directly on our subject (1):

All types of monsters are developmental arrests. The type induced experimentally depends on the particular moment or moments during which the developmental rate was reduced. The study of the growth influences of one embryonic organ on another is one of the most important problems in the analysis of structure. The egg probably has a definite coefficient of metabolism dependent upon the interaction of its specific chemical structure and the given environment in which it normally develops. The means of interrupting development seem to reside entirely outside the egg itself. They are properties of the environment. Changes in the supply of oxygen would seem to be the most probable cause of interrupted development in the rare cases of this phenomenon among mammals. That organ developing at the most rapid rate or having the highest degree of metabolism or oxidation at the time of the stop is less able to initiate its original rate when the moment of resuming development occurs than are those parts that were developing more slowly. No developmental environment in nature is constantly perfect, and this fact is the underlying cause of the frequently occurring malformation and monstrous productions.

Among the abnormalities in fishes produced experimentally by Stockard were double headed and double bodied and twin individuals; single individuals with various eye defects, malformed brains, mouth deformities, abnormal otic vesicles, etc. Embryonic stages of development, he states, are passed through at a specific rate. This rate is not uniform throughout development. Periods of rapidity alternate with periods of slowness or quiescence.

Mott considers feeblemindedness as a terminal stage following psychoses in ancestors. Rosanoff, Orr and others say that feeblemindedness is not related to insanity and they support entirely the Mendelian law.

In regard to the pathology of feeblemindedness it may be considered an imperfect or arrested development of the cerebral neurones. This arrested development may be faulty in nature or due to disease. The pyramidal cell layers are affected. Sclerosis occurs in twenty-five per cent. There may be found softening, porencephaly, hydrocephalus, microcephalus, inflammatory conditions, cysts, exudative lesions (Southard).

In his report on the examination of one hundred brains of feebleminded children, Wilmarth calls attention to the comparatively large number of cases of actual cerebral disease, in contrast with the relatively small number where imperfect devel-

opment seems the causative agent of the mental defect. The conditions he found in seventy brains were as follows:

Sclerosis with atrophy	12
Sclerose tuberense	6
Diffuse sclerotic change	7
Other degenerative changes	15
Hydrocephalus	5
General cerebral atrophy	2
Nondevelopment	16
Infantile hemorrhage	1
Old meningitis	3
Angioma	1
Glioma	1
Porencephaly	1

In the remaining thirty cases actual disease or imperfect brain development was not demonstrated, but six had hypertrophy of the skull, two recent softening, two were demimicrocephalic and two showed large simple gyri and were overweight.

The eye has been examined to see what defects in the brain development would be manifested in the optic nerve and retina. The following observations were made by Cohen and Clark: But nine of twenty-nine feebleminded examined showed normal fundal appearances. Pallor of the temporal half and edema of the nasal half of the disc were present in seven cases. Two patients showed slight indistinctness of the disc and one wellmarked neuritis. Evidence of an early stage of atrophy was found in six cases. Dilatation of veins was seen in four cases. Of twenty-four imbeciles, fifteen had normal eyegrounds. Only four patients showed pallor of the temporal half and edema of the nasal half of the disc. One patient showed wellmarked atrophy. In fifty-five idiots only two had normal fundal appearance. Temporal pallor and nasal edema was seen in thirteen cases. One showed general congestion of the entire disc, eight presented a generalized pallor of the discs. Optic atrophy was present in three cases. One patient showed dilated veins, another choked disc, another thrombosis of the central vein, another retinal congestion, and another retinal hemorrhage. No specific cause could fully account for the degenerative changes in the optic discs of idiots. The study showed that there is probably a well marked tendency to neural as well as psychic degeneration in the majority of all grades of idiots. Unfortunately the changes noted here can give essentially no clue as to the provoking agent—inflammatory, hemorrhagic, accidental, or other causes, that may have produced the conditions in the eye in the more marked instances of mental defectives, so that while the imperfections in the development of the eye is the real criterion of the probable imperfect development of the brain it furnishes no clue as to the exact etiological factor inducing the same.

PRENATAL ENAMEL DEFECTS IN THE FEEBLEMINDED.

Largely promoted by a desire to note whether there may not be some means of determining or registering grave metabolic or infectious processes which have existed in the mother, or factors in some way accountable for a part of the mental defects shown in the afterlife of the offspring, a study of enamel defects has been undertaken. It occurred to one of us (Clark) that inasmuch as the enamel is such a unique tissue of the body, and also from the fact that enduring defects occur in it *during its formation,* it might be worth while to see if such registered defects connoted a parallel injury to the nervous system during the supposed metabolic disturbances which produced them. Our study of abnormal enamel formation in the feebleminded was entered upon partly on account of the fact that little or nothing relating to the subject is found in the literature; and partly from a preconceived idea that it would be commonly met with and perhaps be of biological and etiological importance.

One of the latest writers on stigmata of degeneration in the feebleminded (Barr) speaks of "notched or furrowed teeth as due to inherited syphilis, common to all grades." Our investigations, however, were not of syphilitic teeth but of a peculiar hypoplasia thought to be due to other causes.

It is maintained that syphilitic infection has a faculty of producing enamel defects through metabolic disturbances in the embryo. Stein supports this also but states that nonsyphilitic hypoplasia of the teeth has been observed in the bull and the dog, as well as in man, depending on some local accident or affection, and in such cases does not have the marked characteristics of a syphilitic hypoplasia. The great importance of examining for heredosyphilis in enamel defects, however, is recognized.

Howe, of Boston, effected decalcification in guineapigs with diet deficient in vitamines and obtained subsequent calcification in the same animals by adequate diet. At times he was even able to mark the enamel in this way. His efforts to mark the teeth during pregnancy, however, were not successful.

Zilva and Wells found degenerative changes in teeth of guineapigs fed on a scorbutic diet. May Mellanby produced irregular teeth in puppies by rachitic feeding. Dick found hypoplasia in eight and a half per cent. of 281 poor class, and five per cent. of 122 good class school children of London. Chalky enamel, however, was seen in twenty-eight and a half per cent. and nine per cent. respectively.

We must digress by giving a short résumé of the process of enamelization and its significance.

All writers agree that the enamel differs from all other calcified tissues. Histologically, histogenetically, physiologically and morphologically it stands alone. It is the only calcified tissue derived from the epiblastic layer while all other calcified tissues arise from the mesoblast. Imperfections in its structure, occurring during its formation in the embryo, are said most likely to be produced by systemic conditions in the mother which affect epithelium, as, for example, eruptive fevers. Scarlet fever is most pronounced in causing epithelial loss and sometimes produces pitted teeth or hypoplasia of the enamel.

After the production of the enamel has been completed by epithelial cells these are lost and destroyed and enamel can then be changed only by chemical and physical action of its environment. There is no basis of comparison between pathological conditions of enamel and pathological conditions of bone or other calcified tissues formed by connective tissue as the latter continue to remain in vital relation with the system.

Legros and Magitot first investigated the development of the teeth about 1865. In a table published by them they state that the period at which the enamel organ for the temporary teeth first appears is from the seventh to the eighth week of fetal life; and for the permanent teeth about the sixteenth week. The period for the second molars is placed at the third month after birth; and for the third molars at the third year.

It may be noted in passing (2) that the ectoderm furnishes the following tissues of the adult: Epidermis and derivatives (hair, nails, glands); the conjunctiva and lens of the eye; sensory epithelia of the organs of special sense; the epithelium of the mouth; the enamel of the teeth; oral glands; the hypophysis; epithelium of the anus; epithelium of the distal urethra; epithelium of the amnion and chorion; the nervous neuroglia, and chromaffin cells of the nervous system; the smooth muscle of the sweat glands and of the iris; and the notochord. As regards brain embryology, it is known that during the first two months of fetal life the cortex remains thin and differentiation is slow. At eight weeks neuroblasts migrate from the ependymal and mantle zones into the marginal zone and give rise to layers of pyramidal and other cells typical of the cerebrum. Differentiation of these layers is most active during the third and fourth months but probably continues until after birth. From the fourth month the cerebrum thickens rapidly. Myelination begins shortly before birth.

Preparation for the development of the enamel, then, begins at the end of the second fetal month, from the oral, i. e., ectodermic epithelium. The completed enamel organ consists of four layers of cells. Calcification is from the internal layer of epithelium cells. The dentine papilla assumes the form and extent of the future tooth crown and occupies the concavity of the enamel organ. The enamel ultimately gives the detail of crown form.

Preparations for the calcification of the deciduous teeth are begun about the fourth fetal month. Calcification of the deciduous teeth ends at two months after birth. The change takes place within the substance of the papilla whereby it is altered from an organic to an inorganic substance.

One author states that previous to the time of birth the teeth appear to be little disturbed by certain morbid conditions which might be present in the parent and from their earliest inception up to this period their development proceeds with but little interruption and with much regularity.

According to various dental authorities, Noyes, Broomell and Fischelis, Burchard and Inglis and others, hypoplasia of enamel is a disturbance in structure caused by an arrest or perversion of the function of the enamel forming tissue during development; that it is especially likely to follow infectious diseases that affect the epithelium, such as scarlet fever or measles; but it may be caused by any diseased condition which is serious enough to produce marked disturbance of nutrition.

When hypoplasia occurs prenatally, from whatever cause, there are all grades of manifestations of the condition in the permanent teeth, from a slight disturbance in the formation or structure, to complete loss of a portion of the tissue. In all cases the portion of the tissue which was being formed at the time of the disturbance shows a modification of structure. In strongly marked cases the enamel is formed for a time and when formation begins again the new formation may be telescoped onto the old. The entire crown may be shortened and stunted; the surface of the tooth may present grooves the depth of which is dependent on the duration and severity of the disturbance. The grooves are accompanied by pits. White spots may appear. The latter and mottling are more common in certain geographical areas. Mottled teeth, according to McKay and Black (3), were found to occur only in individuals residing continuously in certain geographical areas during the years of the enamel formation. White flecks, brown spots, or even shallow pits were found, and the water supply in those localities was looked upon as a causative agent.

The enamel organ, springing as it does from the ectoderm, the same as the nervous system, is laid down for the temporary teeth, we have seen, from the seventh to the eighth week of fetal life, and for the permanent teeth about the fourth month; although that for the second and third molars may be formed as late as the third year. Infection accidents to the mother or the young child may be registered therefore in the child's enamel defects anywhere from the second month of gestation to the third year of age—a fairly long period of infection registry.

As a preliminary study, we made the following observations at the New York City Children's Hospital and School, Randall's Island, with Gladstone Goode.[1] Three hundred and eighty patients were examined. These ranged in grade from lowest idiocy to highest moron. Particular attention was paid to the first permanent molar, which is the only permanent molar whose enamel organ springs directly from the dental lamina in the same way as those for the temporary teeth. Among children of all grades under the age of the appearance of this tooth no abnormal enamel formation was discovered. In older children and adults our statistics were found to be as follows:

Out of sixty-eight male lowgrade idiots over fourteen years of age, fifty-four had normal enamel, ten had teeth too poor to permit diagnosis and four had pitted enamel. Out of 103 low grade idiot females over fourteen years of age eighty-eight had normal enamel, eleven had teeth too poor to permit diagnosis, and four had defective enamel. Eleven epileptic girls between six and twenty years showed normal enamel. All epileptic boys over twelve years showed normal enamel, out of forty-one examined, except one, whose teeth were too poor to permit diagnosis.

Among the higher grade patients, however, especially among the high grade feebleminded, a considerable proportion had defective enamel. Sixty-nine feebleminded women from fourteen to fifty-five years of age were examined and fourteen showed defective enamel. Among these were several colored girls all of whom had defective enamel except one.

[1] The authors wish to acknowledge the kindly and helpful assistance of Gladstone Goode, D.D.S., in the examination of case material embodied in this study.

The defects discovered were found mostly in the crown of the six year molar and in the incisors and cuspids. They comprised a striation, pitting, diminished enamel and sometimes complete loss.

Among the paralyzed young children, of fourteen inmates examined, eleven had normal enamel; one had indefinitely shown white spots at the tip of the central incisors; one had Hutchinson's incisors; one deficient enamel, white spots, pitting and absent incisors.

A microcephalic and a macrocephalic child were both normal as to enamel. A microcephalic and two paralyzed epileptics among the low grade idiot children had normal enamel.

Among male morons from sixteen to fifty years of age, out of twenty-four examined, twenty-one had normal enamel, two had teeth too poor to permit diagnosis and one had enamel unformed throughout.

Out of twenty-five feebleminded school boys between the ages of twelve and sixteen years twenty had normal enamel; five had pitted, unformed or grooved enamel. Three of these boys were colored and one of the three had pitted enamel.

An attempt was made to ascertain the condition of the mother during the pregnancy of those patients with defective enamel. This, unfortunately, yielded few positive results owing to many drawbacks in collecting the data. No record of the condition of the mother could be obtained in sixteen cases. In three cases the condition of the mother during pregnancy was said to have been good. The mother of one patient was said to have been alcoholic and "out of her head"; one mother died of consumption; four were considered to have been in perfect health; one had edema of the lower extremities and of the hands during the period of gestation; one was considered not to have been strong; one committed suicide after childbirth by drowning; one was definitely insane; one was said to be immoral and deserted her child.

As a general summary, in the 380 mental defectives examined, surprisingly good enamel was found in nearly all patients of whatever grade, including idiots and imbeciles in whom we found scarcely any instances of enamel defect. Among epileptics, microcephalics and diplegics we found no cases. Hypoplasia was found in the largest percentage, seventeen per cent., in the higher grade mental defectives, i. e., the moron and feebleminded, and a disproportionate ratio was noted among colored girls. The character of the hypoplasia for the most part was pitting and striation.

The Wassermann report in all of the cases of defective enamel was found to be negative except one and that was reported as weakly positive.

SUMMARY.

1. While there can be no doubt that defective enamelization of the teeth is the register of a gross teratological fault, we do not know whether this is a metabolic or a developmental defect in the broadest sense or partly the result of a coexistent infection process in the mother or fetus at the time of the defective enamelization. Probably the strict accountability of infection as a cause of the fault cannot be long maintained, not only from our few data but upon general histopathological grounds. 2. Whichever, or both, of the forming causes are held, certainly the injury to a perfect enamelization is not coincidentally registered in neural tissue of the brain. Defective enamel in a questionable feeblemindedness is therefore not of immediate diagnostic moment as far as the possible coincident injury to neural tissue is concerned. 3. The metabolic and infectious cause of defective enamelization still remains obscure.

In conclusion we would like to urge for general discussion: 1. To what extent is feeblemindedness exclusively hereditary? 2. If brain lesions are present in such a large majority coming to autopsy, are such tissues of etiological moment in the causation of the mental defect or are they but secondary to the symptomatic pathology of the gross picture of the disorder? 3. What are the gross teratological defects in feeblemindedness of diagnostic moment?[2]

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[2] It would seem more than likely that some reason for the effort to establish mental defectiveness as a hereditary defect of germ plasm either solely or predominatingly has been due to the fact that the care and training of feeblemindedness in the past as at present have been entrusted to laymen. Psychologists and teachers and individuals ungrounded in medical knowledge have apprehended that the subject in which they have been interested is largely an educational or psychological one. It is but natural that when they look for the real etiology of their problem that it would be found in a field allied to their own and in which medical issues as such play but a secondary role. The most active workers and believers in the inheritance of feeblemindedness have been recruited from lay individuals. We are aware that many critics might with some show of logic maintain that the opponents to the heredity theory are physicians and those, perhaps, not especially skilled in psychology or pedagogically trained in a broad sense.

[The discussion of this intensely interesting paper will be found in this issue of the Journal on page 643. Editor.]

A Group of Cases Illustrating Diagnostic Difficulties During an Epidemic of Acute Encephalitis*

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During the prevalence of an epidemic, cases are encountered which are difficult to differentiate from, or to be recognized as, the disease then prevalent. The recent experience with acute epidemic encephalitis offered no exception to this rule. During the early period of an epidemic many physicians fail to diagnose the disease, either because they are not aware of the existence of the epidemic or because the disease is of a mild form, or because the typical symptoms are missing. When the epidemic reaches its height, and clinicians become familiar with its various clinical manifestations, the tendency to diagnosticate as such all cases bearing a resemblance to the disease becomes more pronounced. Especially is this true of cases in which other etiological factors can not be ascertained. The establishment of a correct clinical diagnosis is frequently impossible, and the true nature of the case can be ascertained only by a careful study of the pathology of the brain and cord.

Syphilis of the central nervous system, tumors of the brain, and tuberculous meningitis were three conditions which caused especial difficulty in diagnosis. The following cases will serve as illustrations:

Case 1.[1]—M. B., aged fifty-nine; admitted January 15, 1921, died January 21, 1921. The patient was a housemaid; her husband had died of general paresis; there were no children. For ten years the patient had had a glandular enlargement on the right side of the neck. She had had a cough, and attacks of vomiting and constipation for a year without pain, melena or hematemesis. During the six months before admission to the hospital, this condition became aggravated, and a glandular swelling appeared also on the left side of the neck. In the spring of 1920, while at another hospital, a lymph node had been removed, a frozen section of which showed a mass of chronic granulation tissue with pronounced round cell infiltration and considerable endothelial proliferation. There were giant cells and rather extensive areas of necrosis. Some areas were suggestive of tuberculosis, but no definite tubercles were present, and no tubercle bacilli were found. The diagnosis of syphilis was made. The blood Wassermann was positive.

A week before admission the patient exhibited general malaise, headache, vomiting, and a temperature of 102° F., together with reddened fauces, slight cough, rhonchi over the chest, and insomnia. The last three days before admission she was semistuporous and the temperature remained at 100° F.; the vomiting was less marked. She was poorly nourished, acutely ill, irritable, and unable to speak. The pupils were slightly irregular, and did not react to light and accommodation. No icterus, petechiæ or palsies were noted. The neck was moderately rigid. Chest expansion was poor and equal; breathing was shallow; the patient did not cooperate. The lungs were clear and resonant, so far as could be ascertained. The heart was of normal size and position; the sounds were of good muscular quality, with a soft, transmitted systolic murmur at the apex. The pulses were equal, slow, and regular, the tension being increased; the radials showed moderate thickening. The abdomen was tympanitic in the upper part, with generalized voluntary rigidity; an indefinite but rather firm, irregular mass, somewhat rounded, was felt deep in the midabdomen. In the upper extremities there was fair and equal power, and a slight clubbing of the fingers; in the lower extremities there were no palsies, deformities, or edema. The knee jerks and Achilles reflexes were absent. Small firm, irregularly enlarged lymph nodes, varying in size from a large pea to a hickory nut, were found in the submaxillary region; also a few in the axillary, and some in the inguinal regions. At the posterior angle of the left maxilla several small glands were confluent and adherent to the skin.

The following were the laboratory findings: Hemoglobin, seventy-five per cent. (Kuttner); red blood corpuscles, 4,800,000; white blood corpuscles, 13,200; polymorphonuclears, seventy-four and five tenths per cent.; lymphocytes, sixteen per cent. No abnormalities of the red blood corpuscles were noted. On January 17th, two days after admission, the patient was more stuporous, the face more flushed, the respiration more rapid, the rigidity of the neck remained unchanged. There was no Babinski or Kernig. The temperature was normal. There was no dulness over the lungs, and as the patient's breathing was very shallow, no râles were heard. The kidney function was normal. The pupils were narrow. Nerve heads were normal. Fifteen c. c. of clear, somewhat flaky spinal fluid were withdrawn under moderately increased pressure; cytology 550 cells, ninety per cent. lymphocytes. The blood Wassermann was reported as suspicious (±); and spinal fluid negative. On January 18th Cheyne-Stokes respiration and a fairly good pulse were noted. A few moist râles were heard at the extreme left base, but no dulness or evidence of consolidation. There was no evidence of lues in nose or nasopharynx. At this time the diagnosis of taboparesis was considered, but encephalitis could not be excluded. On January 20th coarse râles were heard all over the chest, but no definite change or dulness were noted; temperature and respiration had in-

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[1] We are indebted to the physicians of the hospital for the privilege of reporting this case and Case E. F.

creased; rigidity of the neck persisted. On January 21st pulmonary edema developed and the patient died. A gland excised from the side of the neck after death was found to be tuberculous.

AUTOPSY FINDINGS.

Gross anatomy.—There was a moderate amount of injection of the vessels of the pia arachnoid; also some flattening of the gyri of the left dorsolateral surface in the midfrontal region. The pia arachnoid had lost its translucency and was thickened over the entire base of the brain, and to a lesser degree over the rest of the cerebral surface. A few whitish areas, tuberclelike in appearance, were found irregularly distributed over the surface of the cerebrum and cerebellum. There were no apparent macroscopic changes in the vessels at the base of the brain. The cranial nerves were at their origin, imbedded in the thick meshes of the infiltrated meninges. This was particularly true of the optic chiasm and the optic nerves.

Microscopic anatomy.—Sections were made at various levels of the brain stem as well as from various portions of the cerebral cortex and cerebellum. The leptomeninges were markedly thickened and infiltrated with numerous lymphocytes and endothelial leucocytes. A few polymorphonuclear leucocytes, a few red blood corpuscles and fibroblasts were among the elements of infiltration (Fig. 1). The vessels showed marked thickening of the intima, with infiltration of the subintimal space as well as the adventitial space. At places it appeared that leucocytes from the blood stream had made their way through breaks in the intimal lining. This process of perivascular infiltration and intimal thickening could be traced along the course of the cortical vessels. The cortex underlying the meninges presented evidence of degenerative as well as inflammatory changes. Small areas of coagulation necrosis resembling tubercles were found here and there in the meninges over the cerebrum and cerebellum. In addition to the above described changes, the leptomeninges at the base of the brain showed marked edema. In the brain stem there was only a moderate amount of thickening of the adventitia of the smaller bloodvessels, with frequent areas of perivascular edema. Material stained for microorganisms showed the presence of numerous tubercle bacilli in the pia arachnoid.

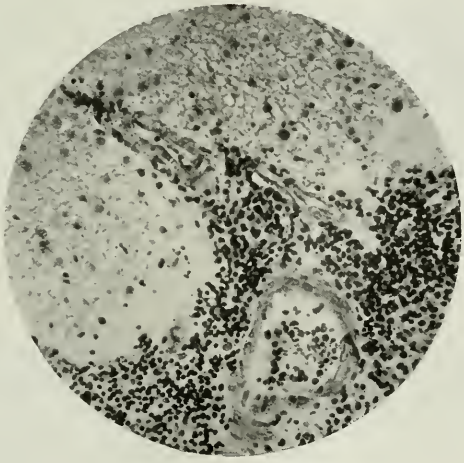

FIG. 1.—Case 1. Tuberculous meningoencephalitis. Section of the precentral gyrus, showing marked infiltration of the piaarachnoid. Small lymphocytes are predominating in the infiltration, though macrophages, polyblasts, and a few plasma cells are also encountered. The vessel shows distinct thickening of the intima. Amyloid bodies in large numbers are seen in the underlying cortex.

The clinical picture presented by this case suggested two possible diagnoses: acute epidemic encephalitis or cerebrospinal lues with terminal infection. On the one hand, it must be remembered that the patient entered the hospital at a time when numerous cases of encephalitis were in the wards, so that it was very natural to incline towards this diagnosis. A week before admission the patient apparently manifested an acute illness, with fever, headache, vomiting and insomnia, rapidly followed by semistupor. These symptoms are not at all unusual in cases of encephalitis. The examination revealed irregular, fixed pupils, and lost knee jerks and ankle jerks, all of which have been frequently observed in the tabic forms of epidemic encephalitis. A further reason for this diagnosis was the marked pleocytosis in the spinal fluid and the negative blood and spinal fluid Wassermann. Even in the later course of the disease nothing developed to exclude this diagnosis.

The facts pointing towards the diagnosis of cerebrospinal syphilis or taboparesis were that the husband had died of general paresis, and that the gland excised from the neck of the patient had been reported in another institution as being luetic, and that she had received antiluetic treatment. The clinical symptoms, likewise, could be interpreted in terms of lues. Against this assumption, however, although not absolutely excluding it, was the acute and brief duration of symptoms before admission, the rapid development of a semistuporous state, the presence of fever, and the absence of biological findings in the blood and spinal fluid. The presence of so large a number of lymphocytes in the final fluid in an acute luetic condition with a negative Wassermann also indicated some other infectious agent, although it could not absolutely exclude syphilis.

Tuberculosis was not considered at all. The presence of such a number of cells early in a tuberculous process is uncommon, but not unknown. Had the suspicion of tuberculosis been entertained, examination of the spinal fluid for tubercle bacilli would probably have revealed their presence. On the other hand, no evidence of tuberculosis in the lungs could be ascertained. Pupillary phenomena and lost reflexes are certainly extremely uncommon as an early symptom of meningitis, and furthermore, the acute onset and the rapidity of the course, in a woman of this age without a history of tuberculosis, must be conceded as extremely unusual. The pathological findings in the case, however, make the diagnosis of tuberculosis certain.

This case shows very clearly how difficult it is

to make a diagnosis between the three diseases, encephalitis, syphilis, and tuberculosis, during an epidemic of encephalitis, especially without the aid of positive laboratory findings.

Case II.—A. B., aged twenty-two; admitted April 25, 1921, died April 26, 1921. Ten days before admission the patient had begun to suffer from pain in the head and back of the neck; she vomited twice; there was marked anorexia from the onset. There were no chills, fever, skin eruption, diplopia, ocular palsies, or joint pains. The pain in the head and neck spread to the shoulders and trunk, and finally to the legs. It was then noticed that her right arm and leg became gradually weaker, and were totally paralyzed two days before admission. For the last twenty-four hours before admission she was unable to void.

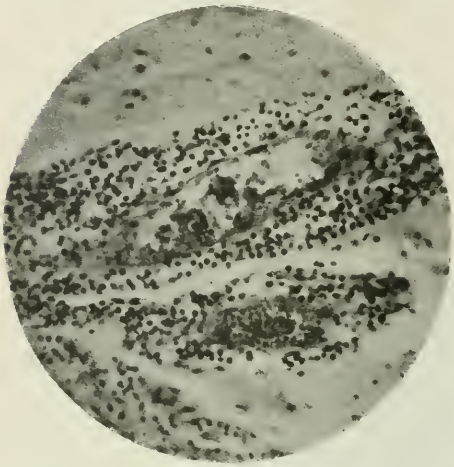

Fig. 2.—Case II. Landry's disease. Section of the medulla, showing two medium sized vessels with small round cell adventitial infiltration. A few plasma cells and an occasional macrophage can be seen in the adventitial space.

She was found to be well nourished and well developed; acutely ill and complaining of abdominal pains. The face and throat and accessory sinuses were negative; the tongue protruded in midline. There was no rigidity or retraction of the neck. The pupils reacted promptly to light and accommodation; the left was larger than the right; bilateral corneal anesthesia was noted; there was no ptosis. The heart and lungs were negative. The abdomen was prominent, chiefly in the lower half, and tender; the bladder was markedly distended. The mentality was clear. There was flaccid paralysis in the right arm and leg, and paresis of the left arm and leg. The deep reflexes were diminished; there was questionable left Babinski. The patient's speech was involved.

The blood examination showed 22,000 white blood corpuscles; ninety per cent. polymorphonuclears; no change in the red blood corpuscles. The temperature rose from 98.4° F. to 102° F. The urine showed a faint trace of albumin and a few white blood corpuscles.

Later in the day the patient was breathing with great difficulty; she cooperated well. All the reflexes were lost, and flaccid paralysis became complete in both upper and the right lower extremities, and almost complete in the left lower. There was a doubtful Babinski sign on the left. Pain and touch sense were intact. It appeared that there was a paresis of the diaphragm. On April 26th there was a divergent squint, and right facial weakness. The tongue could not be protruded. There was marked dyspnea; intense cyanosis; and mild stupor. There was bilateral flaccid paraplegia; sensation was apparently intact. The patient responded to commands, and relapsed into stupor. No puncture was made. Death occurred on the same day. The diagnosis of acute ascending paralysis (Landry's disease) was made.

AUTOPSY FINDINGS.

Gross anatomy.—The meninges and dura were normal; the pia arachnoid was markedly injected and presented several small hemorrhagic areas on the convexity of the cerebral hemispheres. On section the brain substance showed frequent petecheal hemorrhages. The spinal cord was soft throughout its entire length, and on section presented extremely pale and granular surfaces with poor demarkation of its gray and white substance. In the region of the thoracic segments the dorsal tracts appear to have been replaced by a mass of softened tissue.

Microscopic anatomy.—Sections were taken from the various portions of the cerebral hemispheres and also from various levels of the brain stem and spinal cord. The corpus striatum, the thalamus, midbrain, pons, and medulla were also studied. The most frequent findings were the extensive perivascular infiltrations which were most prominent in the region of the medulla and throughout the cervical and dorsal regions of the spinal cord. The migration of the elements of adventitial infiltration into the adjacent

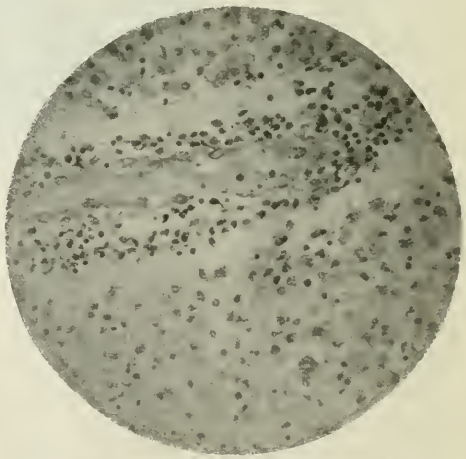

Fig. 3.—Case II. Landry's disease. Section of the spinal cord in middorsal region, showing an extensive area of softening surrounding a vessel with adventitial infiltration. The area of softening is composed of a large collection of glia cells (granular cells), "gitter" cells.

parenchyma was extremely prominent, and gave rise to areas of focal infiltration. These adventitial and focal infiltrations were composed of small lymphocytes, large endothelial leucocytes. There were no fibroblasts. Many eosinophiles were seen scattered throughout the zone of infiltration; close to the areas

Fig. 4.—Case III. Acute epidemic encephalitis. Section from the optic thalamus, showing a vessel with typical adventitial infiltration. Note the nearly complete absence of plasma cells.

of infiltration were frequently found areas of softening, with numerous granular cells intermingling with small lymphocytes and occasional fibroblasts. These processes of infiltration, proliferation and softening were found side by side, varying in degree, at various levels of the cerebrospinal axis. They were most pronounced in the spinal cord, and the height of this process was reached in the posterior columns of the dorsal region of the cord, where it had nearly completely obliterated the tracts of the posterior column, replacing the latter by an area of softening, with some evidence of reparative change, as shown by the presence of young fibroblasts. The findings in the upper portion of the brain stem, beginning with the pontine region, were the adventitial and perivascular infiltrations, while the process of softening was found only occasionally. Parenchymal changes were seen everywhere in the brain and spinal cord (Figs. 2 and 3).

The clinical picture and the pathological findings of this case bear out the diagnosis of Landry's disease, which was made during life. The difficult question to be decided in this case is that of etiology. Cases such as this have been described, and have occurred not infrequently, during an epidemic of poliomyelitis. It has been rare, however, to find such extensive lesions, especially such extensive areas of softening, in poliomyelitis. Nevertheless, the action of the poliomyelitic virus cannot be absolutely excluded. The presence of eosinophiles in great number, such as occurred in this case, would indicate the agency of some other bacterial invasion. The search for organisms in stained sections revealed a small coccuslike body. We are, however, not certain that this body was of bacterial character. No cultures were made of either the brain or spinal cord. The literature of Landry's paralysis is filled with cases which show no lesion at all, or extensive lesions such as described. Various types of bacteria have likewise been cultivated in such cases. The very fact that bacteria of so many different kinds have been cultivated leads one to conclude that bacteria probably plays a secondary rôle. It is more likely that cases such as this are due to an infectious agent of unknown origin. We cannot, from the history of the case, come to any more definite conclusion regarding the etiology.

Case III.—E. F., aged forty-two; admitted February 2, 1921, died February 5, 1921. The patient gave no history of previous illness. She had been married twenty-two years, and had never been pregnant; this the husband believed to be due to his impotency; he had had a chancre eighteen years ago, and had never taken treatment or had a Wassermann test made. The patient gave a history of regular menses. She had suffered with lower abdominal and inguinal pain, on account of which a gynecological operation had been performed a year previously, without benefit. Six months later she was given antiluetic therapy for tertiary lues, at Vanderbilt Clinic, in the form of intravenous and intraspinal injections. Generalized pains throughout the body followed. Headaches became very severe, preventing sleep. Three weeks previous to admission to the hospital, there was a sudden appearance of jaundice, during which time, at Bellevue Hospital, one intraspinous and one intravenous injection of arsphenamine were administered. Six days previous to admission, the patient complained of a gradual

Fig. 5.—Case V. Subacute epidemic encephalitis. Medium sized vessel in the region of the globus pallidus, showing distention of the adventitial space. The limiting membrane is surrounded by a wide zone of accumulated amyloid bodies.

diminution of vision, up to almost total loss, and transient diplopia. She suffered from insomnia. She had had a convulsion two days before admission, from which she had awakened without a subsequent

period of unconsciousness, and had then become stuporous; she remained thus until her arrival at the hospital. She was very weak, her voice had been barely audible for five days.

A well nourished, middleaged woman; she was lethargic, but could be roused; slight cyanosis was present; she was breathing rapidly, with forced expiration; she complained of generalized headache. Purulent conjunctivitis was noted; the pupils were irregular and fixed; the patient did not cooperate for determination of ocular movements; there was no evidence of nystagmus; moderate ptosis of both lids was noted. There were no petechiæ. The tongue was coated, protruded incompletely, and did not deviate. Tonsils and pharynx were congested, and covered with mucus. There was slight weakness of both sides of the face, and marked rigidity of the neck, partly voluntary. The lungs were hyperresonant; no râles were heard. Sounds at the apex of the heart were forceful; a soft systolic murmur at the apex was transmitted a short distance to the left; there were no accentuations; the rate was increased and regular; the pulses were equal and regular, and easily compressed; there was no thickening. The blood pressure was 125 80. Power in the arms was poor but equal; fingers were clubbed; there was moderate hypotonia. Power in the legs was poor but equal; there was no Kernig; there were no pathological reflexes; the deep reflexes were bilaterally diminished. The abdomen was negative.

Blood count showed hemoglobin, ninety-four per cent (Kuttner); red blood corpuscles, 4,800,000; white blood corpuscles, 11,000; polymorphonuclears, sixty-six per cent.; lymphocytes, twenty-five per cent.; no abnormality of red blood corpuscles. A lumbar puncture was made, ten cubic centimetres of clear fluid being removed under very slightly increased pressure; cytology forty cells, mostly lymphocytes. Blood Wassermann ++; cerebrospinal fluid .8-1 c. c. ++++. The retinal veins were somewhat distended; fundi were otherwise normal. In the final note made on February 6th, the case was considered to be one of encephalitis lethargica, complicated by the presence of positive Wassermann in blood and spinal fluid.

Autopsy findings.

Gross anatomy.—The gross anatomical findings were limited to a moderate amount of flattening of the convulusions and widening of the sulci of the left frontal lobe; a moderate amount of congestion of the pial vessels and a considerable amount of clear exudate in the pia arachnoid, limited to the frontal regions particularly.

Microscopic anatomy.—The meninges were studied with particular care at various levels of the cerebrospinal axis, and very little change was noted. Only in a limited number of sections was there a moderate amount of distention of the pia arachnoid space with only a meagre amount of infiltration, limited to a few small round cells and a few macrophages, with an occasional fibroblast. The meningeal vessels showed no change whatsoever, aside from a moderate amount of congestion. There was no thickening of the intima, no splitting of the elastica and no infiltration of the adventitia. The larger vessels at the base of the brain were also free from any changes in their various coats. Sections taken at various levels of the cerebral cortex showed no definite parenchymatous changes. The vessels, however, especially in the medullary portion, showed a moderate amount of perivascular infiltration. Sections throughout the brain stem, including the midbrain and the hindbrain, showed numerous extensive lesions, characterized by infiltration of the adventitial layer of vessels, focal areas of infiltration, and occasional areas of softening. The elements of infiltration were mainly small, round cells, endothelial leucocytes and "gitter" cells filled with pigment granules. There was almost a complete absence of plasma cells. Throughout the parenchyma a few mononuclear elements had wandered away or were in the process of wandering out of the adventitial spaces. Rod cells (Stäbchen Zellen), were also frequently seen. The microscopic picture, because of the absence of meningeal involvement, the lack of cortical changes, the rather limited number of plasma cells, and the absence of endarteritis, led to the conclusion that the pathological changes were characteristic of acute epidemic encephalitis, and not of cerebrospinal lues (Fig. 4).

The great difficulty presented by this case was the differentiation between cerebrospinal lues complicated by some acute process, probably also luetic in origin, and acute epidemic encephalitis. If this patient had been admitted to the hospital at the time when the epidemic of encephalitis was not prevalent, it is questionable whether this latter condition would have been at all considered. The history of lues in the husband; the fact that she had received antiluetic treatment before admission, at two reliable institutions, and the physical signs on admission, were sufficient to make a diagnosis of cerebrospinal lues, to which there might have been added an acute, luetic meningoencephalitic process. The jaundice could be explained as a sequel to the administration of arsphenamine. The acute onset, with headache, diminution of vision and diplopia, followed by convulsive seizure and subsequent stupor suggested at one time the diagnosis of acute epidemic encephalitis in a person suffering from lues. This view was based on the occurrences of similar clinical pictures during the height of the epidemic of lethargic encephalitis in cases in which lues was not in question. But we feel in this instance the correct diagnosis could not have been made at the bedside, and was entirely dependent on the histological studies of the brain and cord.

Case IV.—T. D., aged eighteen; admitted November 29, 1920, died December 2, 1920. A week previous to admission, while the patient was at the Polyclinic Hospital, convalescing from a leg amputation which had been done five weeks previously, it was noted that his head began to jerk backward. Four days later the patient became somnolent, partial ptosis of the right eye developed with twitching of the face, diplopia, indistinct speech, and difficulty in swallowing. He was mentally alert when aroused. He was transferred to the Willard Parker Hospital with the diagnosis of poliomyelitis. His condition improved; speech became more distinct. At no time had there been any paralysis of arms or legs

although the left arm was somewhat weak, and the right arm tremulous. Spinal fluid and blood Wassermann were negative.

PHYSICAL EXAMINATION.

Physical examination on admission revealed weakness of both facials. The tongue could not be protruded; the mouth did not open more than half an inch; the eyes could not be tightly shut, and there was ptosis of both lids. Pupils dilated, reacted promptly to light; internal strabismus of right eye; corneal reflexes diminished on both sides. The neck was rigid. Hands and arms were weak. Knee jerks and Achilles were present, but no clonus; left knee jerk was somewhat the livelier; no Babinski, no Gordon; atrophy of left thigh muscle; no Kernig.

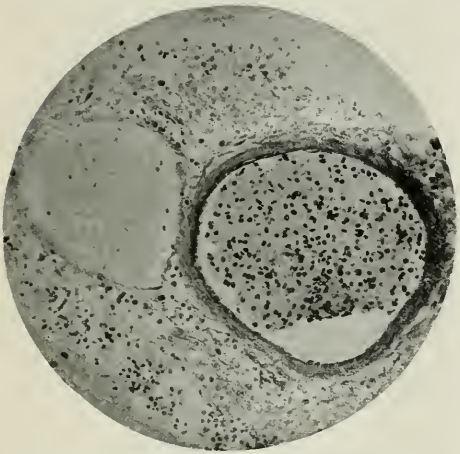

Fig. 6—Case V. Subacute epidemic encephalitis. Artery and vein in the region of the thalamus, showing proliferation of adventitial elements.

On December 1st Dr. Sachs noted the following: "Symptoms and signs point to infectious type of polioencephalitis. Patient cyanosed, dyspneic; pupils dilated, but react to light. No demonstrable ocular palsies; slight facial asymmetry; difficulty in opening mouth; paresis of the left arm. Increase of deep reflexes left side. Throat culture negative for diphtheria." The following notes were made on December 2nd: "Difficulty in swallowing has increased to such a degree that gavage is necessary. Diplopia persists; difficulty in speaking is very marked; temperature has risen to 100.6° F. Cyanosis has deepened; rigidity of the neck has increased markedly." Death occurred later in the day from respiratory paralysis.

AUTOPSY FINDINGS.

Gross anatomy.—The meninges showed only slight congestion, the cisterna magna was moderately distended with clear cerebrospinal fluid. There were only a few delicate meningeal adhesions at the base of the brain. On section, the brain substance showed marked diffuse congestion and numerous small petecheal hemorrhages. No other macroscopic changes were evident.

Microscopic anatomy.—In searching through the cerebral hemispheres and the entire brain stem, as well as the upper portion of the spinal cord, only occasionally were vessels found with typical perivascular infiltration. Numerous perivascular hemorrhages were present; and, still more striking, were the marked destructive changes in the walls of the vessels. This was manifested by the frequently noted ruptures of the vessel walls leading to the extravascular hemorrhages. The staining property of the vessels had been impaired to the extent of giving the appearance of a diffuse hyalinization of all the coats of the vessels. A fairly marked degenerative process was found throughout the parenchyma, with frequent areas of neuronophagia. Accumulations of proliferated glia cells were often seen in the vicinity of smaller bloodvessels.

The clinical picture of this case is that of encephalitis. The jerking movements of the head, diplopia, ptosis, speech affection, difficulty in swallowing, the evidence of meningeal irritation, all point to the correctness of this diagnosis. Furthermore, this case appeared at a time when this disease was epidemic. The striking feature of the case was the rapidity of the progress of the disease. The pathological findings are of special interest, in that the lesion was largely hemorrhagic, with very little evidence of the usual perivascular lymphocytic infiltration, and the marked effect upon the walls of the bloodvessels, which must have been due to a distinct action of the toxin of the disease. We feel that in this disease the organism asserts its primary effect upon the bloodvessels; and that, depending upon the virulence of the organism and its toxin, there occurs either perivascular infiltration, with subsequent involvement of the parenchyma and the ganglion cells, or, as in this case, the walls of the bloodvessels themselves suffer primarily. The extensive hemorrhages and the rapid development of the disease in this case have been due to this latter form of lesion.

Fig. 7.—Case V. Subacute epidemic encephalitis. Small vessel in the region of the midbrain, showing active proliferation of adventitial elements with formation of young fibroblasts.

The development of the disease bore no relation to the previous operation; nor does the clinical picture resemble an encephalitis due to the poliomyelitis virus, although during an epidemic of this latter disease it would probably have been extremely difficult to have ruled out the possibility of an encephalitic

Fig. 8.—Case V. Subacute epidemic encephalitis. Medium sized vessel in region of the dentate nucleus, showing pronounced degenerative change in the media and adventitia.

process due to it. As further proof of the correctness of our diagnosis, it is to be noted that a rabbit injected intracranially with an emulsion of the brain of this patient succumbed with paralytic phenomena, and its brain showed not only an occasional perivascular infiltration, but, interestingly enough, showed lesions of bloodvessels and hemorrhages strikingly similar to those found in the case.

Case V.—M. P., aged twenty-two; admitted June 9, 1921, died June 12, 1921. The patient suffered from pain in the lower abdomen, with slight vaginal bleeding, five months previous to admission. Ectopic gestation was suspected, and laparotomy was performed. A bicornate uterus and evidence of early pregnancy in one horn were disclosed. Abortion followed. On discharge from the hospital the patient's condition remained below par. She complained of frequent headaches and blurred vision for four months preceding the onset of the acute symptoms. Two weeks previous to admission she suffered from coryza and cough but remained up and about for a few days, when she had a slight chill, followed by a rise of temperature. She was put to bed, and soon showed improvement; two days later high temperature developed, with cough, severe headache, and signs of pneumonia in the left lung. Attacks of vomiting followed, accompanied by delirium and retention of urine. She became somnolent the day before admission.

The patient arrived at the hospital, comatose and restless. There were no ocular palsies; the pupils were dilated, the left more than the right; neither reacted to light. The eyes rolled from side to side. There was no asymmetry of face or rigidity of the neck. The heart was negative; the lungs showed signs of a pneumonic process in both lower lobes. The abdomen was negative. The extremities showed no paralysis, no Kernig or Brudzinski, but a slight exhaustible ankle clonus, and bilateral Babinski. The blood picture was negative. The urine was negative, except for a very faint trace of albumin. The temperature, from the day of admission to the day of death, rose gradually from 99° F. to 104.6° F. A spinal puncture was performed; clear fluid was removed under normal pressure; it was found to contain eighty lymphocytes to the cubic millimetre.

On the day after admission the patient remained comatose; there was no definite ocular palsy, although there was a limitation of eye excursion to either extreme position. The left pupil was larger than the right, and did not respond to light. The right pupil responded only slightly. Ptosis of the left eyelid was noted, also a slight flattening of the left lower face, but no paralysis of the tongue or palate, and no rigidity of the neck. The knee and Achilles jerks were not very active. Bilateral Kernig and occasional myoclonic movement were noted. The fundi were normal. On the following morning, the patient remaining comatose, Cheyne-Stokes respiration developed and death occurred from respiratory paralysis.

AUTOPSY FINDINGS.

Gross anatomy.—The dura was free from adhesions, smooth and glistening. The pia arachnoid was edematous throughout, but smooth and glistening, except for small areas at the occipital pole on the left side and over the left cerebral peduncle, where it was thickened and opaque. There were a few small opaque whitish granules noted in the

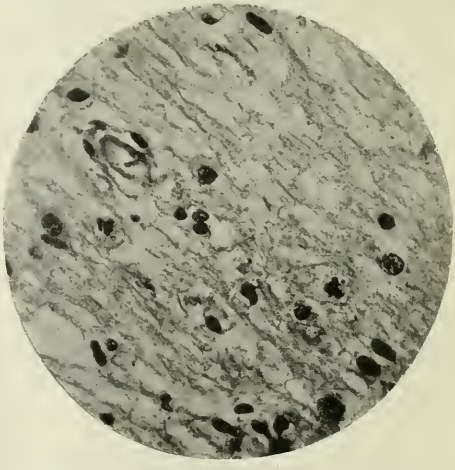

Fig. 9.—Case V. Subacute epidemic encephalitis. Section of the medulla, showing active glia proliferation. Several glia cells with mitotic figures are seen in the field.

Sylvian fissure, which strongly suggested tubercles. The vessels on the surface of the brain were somewhat congested, but no hemorrhages were found. The gyri and sulci were normal. No areas of soften-

ing were noted. The consistency of the brain was somewhat reduced. The cranial nerves appeared normal except for the sixth nerve on the right side, which appeared to be somewhat smaller in circumference than the same nerve on the opposite side.

Microscopic anatomy.—Sections of the cortex,

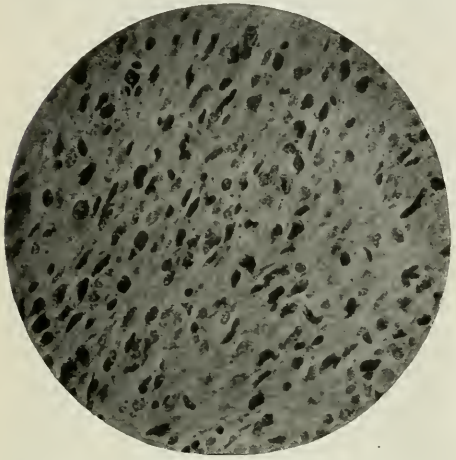

Fig. 10.—Case VI. Spongioblastoma. A typical microscopic field of the tumor mass. Note the fusiform outline of the cells, most of which give off long, fine processes.

midbrain, and medulla presented uniform histological changes. They consisted of markedly developed thickening of the adventitia of the smaller and medium sized bloodvessels. The adventitia was infiltrated by numerous mononuclear elements, such as lymphocytes, polyblasts, and fibroblasts. The latter were frequently seen growing out into the adjacent parenchyma. Many cells were seen in various phases of cell division. Blood pigment and other products of cell destruction were frequently seen in the adventitial coat of the vessel. In some areas perivascular hemorrhages were noted. In the parenchyma there were numerous instances of neuronophagia and of marked diffuse gliosis. Mitosis of glia cells was frequently noted. The pia arachnoid was thickened and infiltrated with small round cells, fibroblasts, macrophages, and red blood corpuscles in a few areas (Figs. 5, 6, 7, 8 and 9).

The clinical picture presented in this case was that of an acute infectious process in the brain. The patient was delirious, vomited, showed extreme restlessness, slight involvement of the eye muscle, and the bilateral Babinski which proved involvement of the pyramidal tracts. These symptoms were such as are not infrequently encountered in acute epidemic encephalitis. The increased cellular content of the cerebrospinal fluid added to the certainty of this diagnosis. At the same time, as frequently happened in instances of acute epidemic encephalitis, the diagnosis of tuberculous meningitis had to be considered. The history of coryza, and especially the presence of signs of bronchopneumonia made the former diagnosis more probable A careful investigation into the previous history of the patient revealed the fact that for months before the acute onset she was not well, and suffered from headaches and blurred vision. This fact, coupled with the absence of tubercle bacilli in the spinal fluid, indicated that she was most likely suffering from a mild form of epidemic encephalitis, upon which was engrafted an acute recrudescence, with fatal outcome. While the diagnosis made during life was fairly certain, a positive conclusion could not have been arrived at except by the histological study of the brain. The pathological findings support the diagnosis of subacute epidemic encephalitis.[2] An animal inoculated intracranially with an emulsion of the brain developed the disease and showed the characteristic lesions.

Case V.—E. R., aged ten; admitted April 12, 1921, died May 15th, 1921. Four weeks previous to admission the patient complained of headache and dizziness, and fell upon her forehead during an attack of vertigo; she was dazed but not unconscious. Local swelling appeared on the left side of the forehead. Diplopia followed the fall and persisted until admission to the hospital. From the time of the fall she was confined to bed because of instability and weakness of the legs. Periods of somnolence alternated with restlessness. There was occasional twitching of the legs.

Upon physical examination the child was noticed to lie upon her right side, slight turning producing violent vertigo. Right hemiparesis; hypotonia; ataxia; exaggeration of tendon reflexes; bilateral Babinski; deviation of tongue and jaw to the right; right facial weakness, apparently supranuclear; adiadochokinesis

Fig. 11.—Case VI. Spongioblastoma. Section showing typical rosette formation.

in right hand. Pupils reacted promptly to light and accommodation. Nystagmus was more marked to right, less to left and upward, least down. Right external rectus and right superior rectus weak.

[2] We have recently studied three other cases which, because of a similar clinical course and characteristic anatomical changes belong, in our opinion, to a group which we consider as a subacute form of epidemic encephalitis. A complete study of these cases is now in preparation.

Bilateral corneal hyperesthesia. Abdominal reflexes absent. Left half of the tongue was crenated (atrophy). Difficulty in swallowing; diplopia; violent vertigo on sudden movement; occipital tenderness; no pain; no Kernig; no retraction of the neck. The hearing was normal; fundi also normal.

Blood counts: 12,000 white blood corpuscles; polymorphonuclears eighty per cent; no eosinophiles; blood pressure 105/80. The urine was negative. Blood and spinal fluid Wassermann were negative; globulin negative. The temperature remained approximately normal with occasional slight elevation. X ray examination showed nothing of importance, aside from a slight irregularity in sella turcica and slight thinning of cranial bones.

On April 16th the child complained of nausea and spasticity of the right arm and leg developed with marked thickening of speech; more pronounced facial paralysis was shown and spasmodic contractions of the right leg. On April 17th the head bent to the right, the gait was spastic, there was a tendency to fall to the left, and right adiadochokinesis. Spinal fluid was removed under normal pressure. Functional testing of vestibular apparatus indicated pressure on or involvement of the brain stem. On April 25th the child was a little duller; showed signs more and more like pontine encephalitis. On May 5th both optic discs showed decided blurring, especially on the nasal borders. Papillitis was diagnosticated. On May 6th the child was more stuporous, right hemiparesis increasing. Stupor increased on May 7th, and speech was hardly intelligible. The patient could not sit up. Nystagmus was more marked. There was a definite papilledema. On May 11th right hemiplegia was almost complete. There was a right cerebellar tilt of head. Dysphagia was present; the papilledema was increasing rapidly. On May 14th the left knee jerk was absent; there was no Kernig, but bilateral Babinski; abdominals were absent; Cheyne-Stokes respiration. Death occurred that day.

The diagnosis in this case varied during the patient's stay in the hospital. At first, she was regarded as a case of epidemic encephalitis; later on the possibility of a neoplasm in the pons or fourth ventricle was considered; and finally, with the appearance of the choked disc and the persistence throughout the course of symptoms pointing to cerebellar involvement, the diagnosis of tumor was entertained, and operation advised.

AUTOPSY FINDINGS.

Gross anatomy.—The dura was normal; the pia arachnoid was thickened at the base of the brain, particularly at the area covering a neoplasm. The cerebral hemispheres, aside from a moderate amount of flattening of the gyri (due to increased intracranial pressure) and shallowness of the sulci, showed no abnormality. At the base of the brain the normal topographical landmarks, such as the superficial origin of the cranial nerves, the cerebral vessels and the general outline of structures in the interpeduncular space, pons cerebellum, and medulla, were to a great extent obliterated by a diffusely spreading mass. The latter appeared to extend from the right middle cerebellar peduncle over the pons to the corresponding peduncle on the opposite side, then downward, covering the rest of the pons and the upper part of the medulla. This growth could also be traced cephalad, covering the right cerebral peduncle. On making several horizontal sections of the brain stem throughout the extent of the growth, it was found that the basal portion of the midbrain, pons, and upper part of the medulla were infiltrated to a depth of about one centimetre with the diffusely growing mass.

Concerning the cranial nerves, the first and second were normal, the third on the right side was flattened and ribbonlike. The same was true of the fourth, while the corresponding nerves on the left side were uninvolved. The fifth nerves were both caught in the mass, both sixth nerves were flattened, the seventh and eighth on the right side were soft and poorly defined. The ninth, tenth and eleventh nerves were apparently normal, while the twelfth were both covered in part by the tumor mass with only a few rootlets finding their way onto the free surface.

Microscopic anatomy.—Sections taken at various levels of the tumor mass presented a uniform appearance, characterized by a rich cellular structure, and an abundant vascular supply. The majority of cells were fusiform in outline, giving off long processes which appeared to anastomose with neighboring processes, and form a rather thick recticular net-work. Some of the cells appear to be bipolar, strongly suggestive of young glial elements. Throughout the field numerous rosettelike structures were seen, having the appearance of small acini. Giant cells were also frequently found irregularly distributed throughout the field. Ependymal cysts were also noted. The richly cellular content, the presence of numerous young glial cells, (spongioblasts) the presence of rosettes and ependymal cysts, lead us to the conclusion that the tumor is a gliosarcoma, but for which the term spongioblastoma is more appropriate. (Figs. 10 and 11.)

This case presented all the classical symptoms of a tumor beginning in, and involving, the right lateral lobe of the cerebellum. On admission to the hospital the only symptom lacking in the syndrome was a choked disc, which is a symptom of increased intracranial pressure, and not depending at all upon the part of the brain involved. The onset of symptoms was apparently acute, in that the child fell, and following the fall complained of diplopia. However, she had had attacks of dizziness and headache previous to the fall, but these symptoms had been disregarded by the child and the parents. The apparently acute onset, the absence of choked disc, and the rapid development of symptoms, together with an occasional slight elevation of temperature, brought up the question of encephalitis. The diagnosis of encephalitis was ruled out by the exclusive involvement of the cerebellum, the absence of cellular elements in the spinal fluid, and the absence of any symptoms of meningeal irritation. With the rapid development of a bilateral choked disc, the diagnosis of cerebellar neoplasm was again considered, and this diagnosis was substantiated by the autopsy.

One difficulty experienced in the diagnosis at the early stage of the disease was the appearance of a

right hemiparesis, when all the symptoms pointed to the involvement of the right lateral lobe of the cerebellum and adjacent structures. Cases, however, of homolateral paresis with cerebellar lesions have been described, and the condition is probably due to indirect pressure upon the opposite pyramidal tract. The delayed appearance of papilledema was also responsible for the hesitancy to diagnose a tumor, although the absence of one symptom ought not outweigh the constancy of other cardinal symptoms. If this patient had not been admitted to the hospital during an epidemic of acute encephalitis, there would probably have been no difficulty in making the diagnosis.

Some Remarks on Penetrating Injuries of the Eye by Steel Particles*

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Penetrating injuries of the eye may be divided into two classes, namely, foreign bodies that penetrate the eye and come out again through natural causes, and foreign bodies that enter the eye and stay there. By penetrating wounds I do not mean small foreign bodies that penetrate the outer coats of the eye and may be picked out by a spud or knife or brushed away with cotton tightly wound upon a toothpick, I mean foreign bodies that actually penetrate all of the coats of the eye and enter the interior of the eyeball itself. Do not let it be assumed, however, that I seek to minimize the importance of small foreign bodies like cinders and fragments of emery that lodge in the coats of the eye, because I know full well the serious consequences resulting from such apparently trifling injuries. Such small foreign bodies should be carefully removed under strict aseptic precautions, because all who have had experience have seen cases where the improper and unclean removal, or attempts at removal, of such small foreign bodies has resulted in infection and the loss of an eyeball. Such unfortunate results are usually obtained by some shop workman who obtains an unmerited reputation for the removal of foreign bodies, and who does so with improper instruments and under unclean conditions, to say nothing of improper lighting facilities. Such results are also not infrequently obtained in the manipulation of shop doctors or inexperienced physicians who feel that the accident is so trifling that it is unnecessary to consult a specialist. I am referring in this paper, as I have said before, to foreign bodies that actually perforate the coats of the eye and enter the interior of the eye and are either pulled out, or drop out, or are worked out by the movements of the lid, or remain inside of the eyeball.

Foreign bodies coming under the first classification are usually long spindling pieces of steel that are sent with force through the air, perhaps by the forceful blows of a hammer on a chisel, and enter the eyeball either through the lid or directly into the eyeball itself. The lid, of course, is a great protection to the eye, and many an eye is saved from serious damage by the instantaneous closure of the lid upon the approach of danger, but sometimes the foreign body is driven with such force that it passes directly through the lid and into the eyeball itself. If the foreign body is of the long spindling variety it is usually picked out by the patient himself, or by some friend, leaving a hole through the lid and a perforation of the eyeball. Such lid perforations usually take care of themselves with proper treatment, although I have seen lids badly lacerated under conditions of this kind, requiring several sutures and careful manipulations to produce a normal condition of the lid later on; but it sometimes happens that the closure of the lid is not quite quick enough and the foreign body passes directly into the eyeball. It is then sometimes picked out by the injured man himself, or a friend, or a doctor, or is winked away by the action of the lid, leaving a more or less serious condition of the eye behind. Sometimes the eye is badly cut, either in the cornea or sclerotic, or directly through the sclerocorneal juncture. Sometimes the iris is more or less mutilated. Sometimes there is a prolapse of the iris, requiring a greater or less amputation of the iris in order to smooth off the wound and to prevent adhesions between the iris and the cornea or the iris and the lens. Sometimes the lens itself is perforated and a traumatic cataract produced. All of these conditions have to be cared for according to each individual case, but as a rule it is better to allow the eye to quiet down by rest in bed, quietude, soothing and antiseptic treatment, before resorting to further surgical procedures, unless the iris prolapses through the wound and needs to be gently withdrawn and cut off in order to prevent serious complications. Of course much depends upon the entrance of infection into the eye by means of the foreign body, and it is impossible at the start to look forward and tell what the results are going to be in cases of this kind; iritis may follow, or a detached retina, or a badly swollen lens, all necessitating considerable experience and judgment to handle it properly. Later on, as conditions indicate, a larger iridectomy may be necessary, or the removal of the swollen cataractous lens, and of course it is always possible that a removal of the eyeball itself will be the ultimate result.

The removal of the cataractous lens is by no means such a simple matter as some may think, because it has been my experience that such lenses

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are not by any means as semiliquid as some writers would seem to indicate, many of these lenses are quite hard and substantial in their character, and are not readily removed by the small incision produced by even a large triangular knife or keratome. As a matter of fact, my experience has led me almost to abandon the keratome knife in such operations and to use a Graefe cataract knife in order to produce a larger incision, because it is always bad policy to try to get a cataract out of an incision that is too small, too much pressure upon the eyeball is thereby produced and vitreous is frequently lost. If, however, it is deemed advisable to use a keratome it should be a large one, and it will frequently be necessary to enlarge the incision by the use of delicate scissors. It must also be remembered that in such traumatic cases the posterior capsule and hyaline membrane are frequently ruptured, thus making it easy for large amounts of vitreous to escape during the operation. Personally, I believe it much safer in cases of this kind to use Fisher's retractors rather than a speculum, because the retractors lift the lids from the eyeballs and relieve the eye of the pressure so often induced by the arms of a speculum. I also advise very little pressure to be applied to the eyeball by spoons, etc., for fear of loss of vitreous. I evacuate all of the lens substance that I can easily, and then wash out all of the lens substance that I can with my anterior chamber irrigator, gently applied, and, if some particles of lens substance persists in remaining behind, I prefer to leave it rather than to be too energetic in my efforts for fear of encouraging a great loss of vitreous. Most of such lens substance will be absorbed, and we should never forget that in endeavoring to save an eye we should not destroy it by too meddlesome surgery.

We now come to the consideration of foreign bodies that enter the interior of the eye and stay there, and these cases are of course ones where our greatest hope lies in the proper and judicious use of the electric magnet, in fact, in order not to draw out this paper to unreasonable lengths I would take the liberty of confining myself to the consideration of those foreign bodies that perforate the eye and remain inside of the eye, that are magnetic in their character, not forgetting that foreign bodies of various kinds may enter the eye and remain there, such as wood, glass, shot and nonmagnetic iron Foreign bodies may of course enter the eye through the cornea, through the sclerocorneal juncture, or through the sclerotic, and these facts constitute the important features of this subject. Foreign bodies may of course be of all sizes and shapes. I have seen particles of steel driven into the interior of the eye so small that they almost took a magnifying glass to see them, and I have seen them so large that it was a mystery how the eyeball could conceal them. I have seen them long and short, smooth and rough, and I have never seen any two just alike. Some objects merely pass through the corneal layers and drop into the anterior chamber, some are lodged in the iris, others in the lens, others in the vitreous chamber, some are tightly wedged into the sclera, and some pass clear through the entire eyeball and are lodged in the tissues of the socket back of the eyeball; so you see we have all of these things to take into consideration, and each case must be studied by itself. Of course, when a piece of steel is in the anterior chamber, or iris, or lens, it can be easily seen, but when objects take refuge back of the lens they are frequently not easily discernible even with the ophthalmoscope. If the object is in the anterior chamber an incision through the cornea large enough to permit of its easy escape through the wound on to the magnet may be all that is necessary, especially if no infection or iritis follows. The same may be said if the foreign body is lodged in the iris, although under these circumstances, in drawing out the steel with the magnet, some iritic tissue will very likely come with it. I once saw a piece of steel so firmly embedded in the iris that the magnet not only drew out the steel but the entire iris at the same time. This is a danger that must not be overlooked, and too much magnetic force should not be applied under conditions of this kind.

If a little of the iris escapes it may perhaps be coaxed back into place again, but if it proves obstinate it may be cut off, thus making an iridectomy. A well dilated pupil will sometimes disclose the foreign body in the anterior capsule or in the lens itself. Steel in this location can usually be withdrawn with the magnet, but not always, and some authorities advocate that, inasmuch as the lens is practically unsupplied with nerve tissue, if a foreign body is located in the lens it can be let alone, but with this view I do not agree, because I believe that intraocular foreign bodies should be removed wherever they are if possible, and if it is necessary to remove the lens as well as the foreign body I should certainly advocate this procedure rather than to allow a piece of steel to remain in the lens in the hope that no trouble would follow. One cardinal rule I have found of great value, and that is to make my incisions amply large enough to allow of the easy exit of the steel. This more than anything else I believe avoids unnecessary traumatism.

Of course one of the first things we have to do in dealing with intraocular steel particles is to have recourse to clear and intelligible x ray pictures. Whenever I am in any doubt whatsoever as to whether there is a foreign body in the eye I have x ray pictures taken in order to clear up the situation. I find that patients are not trustworthy witnesses under these conditions. Most men who have received injuries assert that there is nothing inside of the eye, but I pay no attention whatsoever to opinions of this kind. I must have good x ray pictures. Not all x ray pictures are reliable. I have been deceived both ways, I have been told that there was nothing in the eye when there was and that there was something in the eye when there was not, but as a rule dependence can be placed upon clear x ray pictures, but they must be clear and good, and taken by a man who understands his business. I always insist upon two clear pictures, one a profile picture and the other a front view picture. If these pictures are good they will, in my opinion, be a sufficient guide as to the locality of the foreign body without going through all of the trouble of what is known as localization. Of course I have no objection to localization, and sometimes it is useful,

but I believe in a vast majority of cases that a good profile picture and a good front view picture will disclose the location of the foreign body sufficiently for all operating purposes. It is not necessary, although perhaps desirable, to get a strong magnet directly over the site of the steel. The interior of the eyeball is not a vast place after all and, in my opinion, if a magnet is going to draw a piece of steel from the interior of the eye, it will do so any way if placed somewhere near the location of the foreign body.

In operative work I divide my operative procedures into two parts, namely, foreign bodies located in or anterior to the lens, and foreign bodies located posterior to the lens. In foreign bodies located in or anterior to the lens I believe it to be advisable to remove the foreign body by what may be called the anterior route, that is, through the cornea, but where foreign bodies are located posterior to the lens I believe it is better to make an opening through the sclera and remove the foreign body through the posterior route. This is a dictum which I enunciated many years ago. This view was at first scorned by most ophthalmologists, who believed in following the rules of Haab, to remove all foreign bodies through the cornea, but I believe now that the rule of removing foreign bodies that are posterior to the lens through the sclerotic is quite generally endorsed. I will make a single exception to this rule, and that is, if I have a patient who comes to me within a few hours after he has been injured and the steel has entered through the cornea and perforated the lens, thus producing a cataract, and is lodged in the vitreous chamber with as yet an unhealed wound, I give this man an opportunity of removing the steel through the avenue of ingress; but if he comes to me after the wound has healed, I then remove the steel through the posterior route. Of course if we remove steel through the anterior route we should do whatever seems necessary under the circumstances. If there is a prolapse of iris it should be cut off; if there is a cataract as much of it should be removed as can be removed in safety.

Some reasons for removing steel, located posterior to the lens, through the posterior route are as follows: In the first place it must be remembered that there are very few genuine Haab magnets in this country. A genuine Haab magnet is a double ended affair, setting upon a standard, and extremely powerful. The magnet is never removed from the standard, the patient sits in front of the magnet and the head is moved in various directions in place of the magnet being moved in various directions. Inasmuch as there are so few of these magnets in this country there is very little use in giving instructions as to what to do with a Haab magnet. There are various magnets put upon the market by electric concerns which are erroneously called Haab magnets, but they are not really Haab magnets. The genuine Haab magnet is capable of drawing small particles of steel from the extreme posterior portion of the eyeball into the anterior chamber, but the magnets that we American ophthalmologists use are frequently not capable of so much drawing power.

It is almost amusing to read the descriptions of how a piece of steel can be drawn by the magnet along the floor of the vitreous chamber and then coaxed carefully along the surface of the ciliary body and through the ligament of the lens into the space back of the iris and then raised up as high as the pupil and drawn through the pupil and dropped into the anterior chamber of the eye, and then taken out by an incision in the cornea without injuring the lens, or anything else for that matter. I do not question but what this can be done, in fact I have done it myself, and I have seen Professor Haab do it in Zurich, Switzerland, but it is quite evident that this can only be done with very small pieces of steel, and with pieces that have no particularly sharp corners to catch, pull and tear the delicate structure of the eyeball as they come along. Steel objects of any particular size will have to be drawn directly through the lens itself, thus producing a cataract, if a cataract has not already been produced by the accident itself. I am, therefore, firmly of the opinion that objects located in the vitreous chamber of the eye had better be removed by an opening through the sclerotic coat of the eye and am confident that much less damage is produced than if we endeavor to pull a ragged, jagged piece of steel of average size through the delicate anatomical structure in the anterior portion of the eyeball.

I am aware of the fact that an operation such as I advocate is liable to produce hemorrhage in the vitreous chamber, detached retina, atrophy of the choroid, etc., but I still contend, all things considered, that this is the safer route of exit of objects located in the vitreous chamber. In performing this operation I make my incision in the quadrant of the eye nearest to the foreign body, as indicated by the x ray pictures. In other words, my incision is made either between the external and inferior rectus muscle, or the inferior and internal rectus muscle, or between the internal and superior rectus muscle, or between the superior and external rectus muscle. I pick up a piece of the conjunctiva with forceps near the sclerocorneal juncture and make an incision with a pair of scissors. I make a triangular flap of the conjunctiva and lay it back, thus disclosing the sclerotic coat of the eye. I then take a Graefe cataract knife and plunge it through the sclera and make an incision parallel with the fibres of the sclera from before backwards, avoiding, of course, the ciliary processes. The size of the incision, of course, is graduated according to the size of the object, as indicated by the x ray picture. I then place the strongest end of the magnet at the opening and turn on the current. If the object does not present readily I turn the current on and off several times so as to jerk the object loose. I direct, or aim, my magnet in the direction of the foreign body as near as I can, as I believe in this way the object is more likely to come out end to end, instead of broadside. It is much easier to pull an object out if it presents end to end, than if it presents broadside. I try not to be impatient if the object does not come at once but keep on using the magnet, being sure, by testing it from time to time, that it is working. If the operation proves tedious I pass the magnet as far back into the orbital cul-de-sac as possible and milk it forward, trying to coax the object along toward the incision. I never introduce a mag-

netic end into the eye itself until all other methods have failed, because I believe that eyes are not infrequently destroyed by the intraocular manipulation of magnetic ends. It sometimes happens, of course, that the object is firmly wedged into the sclerotic coat of the eye and will not come loose, in which case I leave it. It may also happen that a steel particle passes entirely through the eye and is lodged in the fatty tissues of the orbit, in which case it is best to leave it alone if we are convinced of its location by the x ray pictures. I sometimes have been able to remove foreign bodies through the sclerotic opening by holding the two lips of the sclerotic wound apart by two little demagnetized hooks that I suggested years ago. Every effort should, of course, be made to avoid losing vitreous. If I am compelled to introduce a magnet point inside of the eye, I never do it more than twice, as I would rather leave the foreign body than destroy an eye by meddlesome surgery.

After the operation is finished I never suture the sclera, as this membrane is so tough that considerable vitreous is liable to be lost in suturing it, and beside that we leave inside of the eye by means of the suture a particle of silk thread that is likely to produce infection. I simply pull the conjunctival flap over the opening and close it with two sutures, one on each side. I never endeavor to suture the apex of the flap, on account of the scarcity of conjunctival tissue that will always be found near the sclerocorneal juncture and the danger at this point. I have removed hundreds of particles of steel in this way and have never regretted not having sutured the sclera.

It must never be forgotten that the end results in cases of this kind are not always good, no matter how smooth the operation may be nor how soon after the invasion of the foreign body the operation is performed. Intraocular changes, panophthalmitis, cataract, iritis, sympathetic ophthalmia, etc., may follow, and ruin what appears to be a favorable operation. Nevertheless, I believe that by following the suggestions offered in this paper the best results will be obtained in the removal of steel particles from the interior of the eyeball.

I have for many years used the hand magnet, invented by Dr. Sweet, of Philadelphia. While it is a hand magnet and can be conveniently manipulated with accuracy and delicacy it is nevertheless very powerful, and I have very seldom been disappointed in its use.

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Protein Sensitization as a Possible Cause of Epilepsy and Cancer

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The effect of introducing foreign protein into the human body has for a number of years been a subject of ever increasing interest. The employment of diphtheria antitoxin, which first came into general use toward the close of the nineteenth century, first afforded an opportunity for the observation of these effects, and since then there have been many contributions to the literature on this subject, and a constantly widening application of the knowledge gained by experimentation and clinical observation along these lines.

Idiosyncrasies to food, drugs or proteins in the form of dust and pollen have been recognized for a long period, but until recently the whole subject was looked upon as one of the interesting anomalies of medical practice, and no effort was made to explain it upon a scientific basis. During the past ten years, however, great advances have been made in the study of protein sensitization, the meaning of anaphylactic reaction, and the possibilities of clinical utilization of the knowledge gained through animal experiment, and the reactions—many of them unfortunately serious and even fatal—which have been observed in human beings, have become more and more apparent to the medical profession at large. At present one can hardly take up a medical publication—no matter what specialty it aims to cover—without finding something in it relating more or less directly to the subject of anaphylaxis or protein sensitization.

The discovery that numerous affections, the etiology of which had hitherto been shrouded in mystery, owed their origin not to a specific infection but to a sensitization which could be accurately ascertained and very possibly obliterated, gave a tremendous impetus to observation and investigation of these conditions, and it now seems possible to hope that the number of socalled diseases owing their origin to similar causes may be indefinitely extended, and the hope of amelioration and cure infinitely increased.

The suggestion of obscure etiology naturally brings to mind two conditions responsible for an incalculable amount of human suffering and misery, the cause of which has hitherto lain hidden from the most persistent and inquiring students of disease, namely, epilepsy and cancer. Their possible dependence upon protein sensitization has already been suggested by many factors long recognized as contributing to the prevalence and virulence of these affections, and the recent extended consideration of the part played by basal metabolism in the various conditions produced by endocrine imbalance, has brought out many facts having a peculiar interest in this connection. It is now generally accepted that the underlying cause of bronchial asthma is

disturbed metabolism; this same etiology is attributed by many observers to hay fever. Might not the same prove true in regard to epilepsy and cancer?

The disturbances which we know as hay fever and asthma are supposed to be brought about by the action of the split proteins demonstrated by Vaughan, the presence of which is due to imperfect assimilation in the digestive tract. These poisons seek exit through the mucosa of the nasal and bronchial passages, there producing a condition which remains latent until the individual in question inhales some exciting agent—such as a plant pollen or animal emanation—whereupon a typical attack is manifested, the severity of the infection depending upon the hypersensitiveness of the individual to the particular local exciting agent. Reasoning by analogy it would appear by no means unlikely that a similar etiology might be attributed to epilepsy and cancer. It seems possible that epileptic seizures might be the result of exciting agents acting upon the brain through the intermediacy of the nasal sinuses, and in both epilepsy and cancer protein poisoning through ingested food may well be the sole causative factor.

Writing of the treatment of epilepsy I. S. Wechsler (1) recently said: "From the treatment of many cases I have gained the impression, which almost amounts to a conviction, although I cannot prove it, that certain foodstuffs bear a special relation to some of the epilepsies. It has, of course, been known all along that various foods apparently have a deleterious influence in epilepsy, but it seems to me that there is something akin to a sensitization, to a reaction (anaphylactic?) of the organism to certain proteins or possibly endotoxins which result in convulsive phenomena. The periodicity of some of the epilepsies may point in that direction. In a few instances I have been told by patients that certain diets are likely to bring on attacks. One patient definitely attributed his improvement to the fact that he had given up eating eggs, and on one occasion when he did eat them (he used to be very fond of them and ate many at a time) he paid for his heedlessness with a convulsion."

Dr. Wechsler's experience has been very extensive. The basis of the study from which this quotation is made was only fifty-eight patients, but the author's opinions have been formed by observation of epileptics in great numbers, many of his cases being of very long standing. His opinions, therefore, should carry considerable weight.

Dr. J. Finley Bell has kindly permitted me to report two cases from his practice which are interesting in connection with the possibility of a protein sensitization as the exciting cause of epilepsy.

Case I.—The first case is that of a girl, now fifteen years of age. She was breast fed for three weeks after birth, after which the failure of the breast milk compelled a resort to artificial feeding. It was noted that she vomited practically all food of which cow's milk was a constituent, steadily lost in weight, and very shortly rickets developed. Later she became subject to brief periods of stupor when it was impossible to rouse her, and she also acquired a habit of momentarily drooping the head which was for a time supposed to be merely a "cute baby trick," or, if it occurred at the table, an endeavor to mimic her father as he said grace. During the first year of life she had a typical convulsion which was attributed to teething, and this was followed by a half dozen similar seizures, all supposed to be due to the eruption of teeth or to digestive disturbance.

When the patient reached school age she proved an excellent student, but was subject to violent outbreaks of temper, which came on without apparent cause and quickly subsided, the patient afterwards apparently not realizing that anything unusual had occurred. Between the ages of eight and twelve years she had several major epileptiform seizures, with biting of the tongue and involuntary passage of urine and feces. Thereafter, she was regularly subject to major attacks and the outbursts of temper became so violent that the mother described them as frenzy. Constipation became habitual, and immediately preceding the seizures there was marked flatulence.

The patient was placed upon a meat free diet, consisting largely of milk and vegetables; cheese, which was at first included, had to be given up because of its bad effect upon digestion. Under this regimen the epileptiform seizures ceased, but the so-called frenzy outbreaks were unaffected. During one year there was apparently but one nocturnal attack, but toward the end of this period the patient rebelled against the restricted menu, and her craving for meat was given limited indulgence. Within a short time the major attacks had returned with their former violence and frequency.

A careful x ray examination of both head and abdomen failed to disclose conditions which were of aid in diagnosis, but protein sensitization tests gave reactions to cow's milk, cheese, casein, beef and veal. The food restrictions were now revised, so as rigorously to exclude all bovine products, but otherwise the diet was to be as general as possible. Since she has been confined to this diet the patient has had but one seizure of any sort. This occurred in school, when she vomited and fainted, but it was apparently not an epileptiform seizure and may have been due to the accidental ingestion of some sensitizing protein.

Case II.—In Dr. Bell's second case no very marked protein sensitization could be demonstrated. The patient gave an inconstant and feeble reaction to cheese, but clinical observation showed that she was subject to epileptic seizures after eating cheese or butter. When all cow's milk products were eliminated from her diet she ceased to suffer from the epileptic attacks, and more than a year has now elapsed without a return of the seizures. During the past three months she has been taking parathyroid extract.

John Thomson (2), of Edinburgh, reporting two hundred cases of convulsions in infants, lays special stress upon the relation between possible poisoning from the proteins of cow's milk, egg white, oatmeal or other common foods and the idiopathic convulsions of early infancy, and thinks "there can be little doubt that the interesting and as yet only partially understood process of anaphylaxis plays an essential part in the causation of some, and perhaps many,

morbid phenomena." Continuance of the offending diet may lead to asthma, eczema and possible epilepsy in later life.

The relation between food poisoning and the development of epilepsy would seem to be fairly well substantiated by such examples, any number of which could be brought forward if necessary. It seems reasonable to suppose, however, that these poisons may enter the system and penetrate to those areas of the brain where their action is able to produce epileptiform seizures, in other ways than that of being taken into the stomach in the form of food. If the foreign proteins are capable of producing the annoying and distressing manifestations of asthma and hay fever by coming in contact with the bronchial tubes, the mucosa or the skin, could they not cause the symptoms of epilepsy if they were able to reach the exquisitely sensitive nerve centres by passing through the accessory sinuses of the nose? Certainly research along these lines could hardly fail to bring forward some interesting data which might be of inestimable value in clearing away the obscurities with which the etiology of epilepsy is now surrounded.

If an effort was made in every case of infantile convulsions to find the offending protein which was responsible for the seizures I feel sure that many future cases of epilepsy would be aborted. When the protein poisons enter the circulation they seek those areas least able to resist their action, which in these cases are the nerve centres, the irritation of which causes tonic and clonic spasms of the extensor and flexor muscles. If the situation is comprehended early enough, before the continued action of the foreign protein has rendered the affected nerve centres intensively sensitive, and prompt remedial measures instituted, it cannot fail greatly to reduce the future incidence of epilepsy.

L. Duncan Bulkley (3) has long been known as the champion of the constitutional, in contradistinction to the local, nature of all forms of carcinoma, and has defended the position of those who assert that therapeutics can effect far more than surgery in the treatment and elimination of this disease. It has been demonstrated that cancer results from a disturbed activity on the part of heretofore normal cells, and the exclusion of all other possible causes naturally leads us to look to a disordered metabolism as the cause of this disturbed action. Repeated laboratory experiments have shown in a most remarkable manner the absolute controlling effect of diet on the development of inoculated cancer in rats and mice, as with certain vegetable feedings the process was almost entirely inhibited. We thus see that as the laboratory has eliminated the local nature of cancer, it has also, in a measure, established the fact that there are medical aspects of the disease which further studies will show to be of the utmost importance. All these tend to emphasize its constitutional origin and its relation to disordered metabolism, which is now so widely recognized as a causal factor in a vast number of morbid states.

We have it on the authority of Dr. Bulkley that the late John B. Murphy, of Chicago, was pessimistic regarding the ultimate results of the surgical treatment of carcinoma, especially in those patients who were fat and had lax tissues, that is, those who exhibited evidence of imperfect metabolism. He also quotes William J. Mayo as calling attention to the infrequency of cancer among savages and the lower animals as having a bearing upon the question of the possibility "that there is something in the habits of civilized man, in the cooking, or other preparation of his food, which acts to produce the precancerous condition. . . . If flesh foods are not fully broken up, decomposition results and active poisons are thrown into an organism not intended for their reception, and which has not had time to adapt itself to the new function. . . . The prophylaxis of cancer depends, first, on a change in cancer producing habits, and second, on the early removal of all precancerous lesions and sources of chronic irritation."

These views emanating from men who have given years of intensive study to the cancer problem, ought to impress the medical profession at large with the importance of searching for clinical evidence which might aid in establishing the cause of this tremendous menace to the life and efficiency of civilized man. Small evidences, if accumulated in sufficiently large numbers, may in the end be the means of elucidating this seemingly insoluble problem. For instance, there have been some cases of cancer of the tongue which the reporters believed due to the irritation caused by licking postage stamps, as local irritation has long been regarded as a prominent causative factor in all forms of buccal cancer. But does not the fact that the paste used upon envelopes and postage stamps is composed of wheat products and such animal substances as skin and bones, offer another possible explanation of the relation between the contact of the tongue and the adhesive substance, that we are dealing with a protein sensitization, and not a purely local lesion?

When the offending cause is eliminated from the system of the asthma patient the bronchial tubes return to their normal state; the same is true in hay fever and eczema. In epilepsy the patient will suffer an attack of his malady after the ingestion of foreign protein, will recover from the attack, and after a short period of recuperation continue in good health until there is again a sufficient accumulation of protein poisoning in his organism to precipitate another seizure, depending upon the sensitiveness of his nerve centres and the amount of foreign protein gaining entrance to his circulation. When we have to deal with cancer the parts diseased are of a more delicate nature, and if once destroyed regeneration is impossible. But if we can recognize the cause and extirpate it, further destruction will be prevented, and if our efforts have been made early enough a fair prognosis is still possible.

The recently published studies of Longcope (4) on protein hypersensitiveness would seem to bear out the possibility of an anaphylactic origin for both epilepsy and cancer. He tells us that "to explain satisfactorily the clinical manifestations of the idiosyncrasies and allied disturbances, one must consider two factors: first, the possibility of a specific hypersensitiveness toward some protein or some chemical substance, and secondly, the possibility of a direct intoxication by some poisonous derivative

of the protein molecule. How nearly related these are and what part the second plays in causing symptoms in the hypersensitive individual, it is impossible to state at the present time."

The whole subject of protein sensitization is as yet in its infancy, despite the immense amount of work which has been done upon it. Its possibilities appear almost infinite, and it surely offers a bright ray of hope illuminating the obscurity in which those who sought to control and conquer these two great human scourges, cancer and epilepsy, have for so long a time been impotently groping.

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Summary of a Year's Work (1920) in Urology

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The Urological Service at the Brooklyn Hospital holds the same relative position to the other services as is occupied by the various other surgical specialties. While the attending urologist is responsible for all urological cases admitted to the hospital, he is in turn responsible to the attending surgeon in charge of one of the general surgical divisions, and through him to the executive branch of the hospital, for the proper conduct of his service. This arrangement has proved eminently satisfactory and has promoted a cordial coordination of effort. Weekly conferences are held at which the attending surgeon presides and which are attended by all members of the service, both general and special surgery, including the clinical assistants in the outpatient department. At this time interesting cases and obscure diagnostic problems are discussed, errors of omission or commission are fully commented upon, x ray plates, operation and autopsy specimens are studied, deaths and infections are particularly summarized in an effort to determine a possible preventable cause. These meetings have accomplished much in the way of bettering the service, stimulating the interest of the younger men, and standardizing the work of the various departments.

For convenience in summarizing and discussing our work, the urological service may be said to consist of three distinct parts, all however closely related; all under the direction of one chief; and manned by a staff of assistants who rotate in the various departments and their subdivisions; so that at all times every man has some definite relation toward the whole service.

These three parts are:

1. The hospital work proper: urological operations and the care and treatment of patients requiring bed and indoor attention.

2. A well equipped cystoscopy room immediately adjoining the x ray room. Here all hospital patients requiring any form of cystoscopic manipulation for diagnosis or treatment are cared for. In addition to this group, outpatients in whom the diagnosis is obscure and who are likely to require the more advanced forms of cystoscopic examination such as pyelography, waxtipped catheterization, and other similar procedures, are examined in this room, as are patients upon whom fulguration and the other forms of intravesical operative procedures are indicated. This clinic is operated two mornings each week by the chief and two or more of the senior associates.

3. The dispensary or outpatient department where the patients suffering from the venereal diseases (including syphilis) are cared for, and the younger men are trained in endoscopy and cystoscopy in addition to their other routine work, rotating through the various procedures of treatment at monthly intervals. Of course most of our nonvenereal urology comes first to this department. The various problems presented may be worked out there, or the patient may be referred to the special cystoscopic clinic mentioned above.

Under the first heading there were 485 admissions. These cases we propose to group and discuss according to the location of the lesions. While the number of cases is relatively small, yet they serve to demonstrate the methods employed and furnish a basis for conclusions when considered in relation to similar groups of cases studied in preceding years.

SURGICAL LESIONS OF THE KIDNEYS.

There were thirty-five admissions divided as follows: Tuberculous kidney, three; renal calculi, eight; pyonephrosis, three; papillary carcinoma, one; adenocarcinoma, two; hydronephrosis, one; nephroptosis, four; unilateral nephritis, two; pyelonephritis, three; bilateral pyelitis, two; unilateral pyelitis, six.

The tuberculous kidneys were treated by lumbar nephrectomy. Two of the lesions were in adult females, and one in a boy of eight. This is the youngest patient we have had in our clinic. The symptom which drew attention to his condition was bedwetting. Pyuria was demonstrated by the family

physician and the case was referred to us for diagnosis. The ureters were catheterized, illustrating that youth is no contraindication to this procedure, and the diagnosis of left renal tuberculosis established. Of the other two cases, one was on the right side, the other on the left. The three patients made good operative recoveries; the boy is much improved, although he still occasionally wets the bed; one woman is entirely relieved of all symptoms; the other patient is yet, four months after operation, under observation and treatment for an irritable bladder incident to extensive ulceration and contraction. That, of course, is a common story. I believe that most of these conditions finally heal, although many never return to a normal interval of urination, because of the gross damage to the bladder wall caused by the ulcerations. While these ulcers may, and usually do heal, there is left a scarred and contracted bladder. These patients are advised to follow the usual hygienic treatment indicated for tuberculosis in any part of the body. We have tried many forms of local treatment for the bladder and have not been impressed with the results obtained from any of them. It is our custom at operation to remove as much of the ureter as appears grossly diseased, using a separate groin incision if necessary. The ureter stump is cauterized with phenol, touched with alcohol, and tied with chromic catgut. The wound is closed in layers with a small cigarette drain at the dependent angle. In this series all the cases healed *per primam* and remained closed.

Fig. 1.—Adenocarcinoma of kidney. Specimen removed from patient.

Of the renal calculi, one patient refused operation, in one, operation was advised against because of other complicating factors. The remaining six were removed by operation; four by means of pyelotomy, and one, a huge calculus by nephrectomy. This last patient applied for treatment because of two attacks of painless hematuria in the past year. There were no other symptoms. He had a rather stormy convalescence from his operation and suffered from a moderate degree of cardiorenal decompensation. He eventually left the hospital in fair condition and is now, nine months after operation, in fair health and following his regular occupation, although he has an occasional cast in his urine. The four cases treated by pyelotomy made uneventful recoveries and are entirely relieved of their symptoms. Pyelotomy is undoubtedly the operation of choice, even for small calculi in the calyces. It is our custom to suture loosely the wound in the kidney pelvis and reinforce this with a loose suture in the peripelvic fat. We have never had any troublesome fistulæ. Nephrolithotomy we consider a dangerous operation rarely indicated. The other case was a small calculus which had been accurately located by means of pyelography a few weeks previous in the tip of the lower calyx. At operation no calculus was found. A radiograph taken a few days later showed it at the lower end of the ureter, and it was removed by cystoscopic manipulation. Since this experience we have established a routine of making a radiograph a few hours before operation, and believe this should always be done.

Of the three cases of pyonephrosis, two patients were nephrectomized and one subjected to a nephrotomy. The last was a man who complained of left lumbar pain and vesical irritability, which had been present for about a year. There was no history of antecedent infection except a bad pyorrhea which was present at the time of admission. Examination disclosed a somewhat enlarged tender kidney with a moderate amount of pus in the urine and colon bacillus on culture. At operation a small abscess was found in the cortex at the lower pole. Cultures from this were sterile. The abscess was incised and drained, and the patient made a prompt recovery with complete relief of symptoms. One case followed and complicated a prolonged puerperal sepsis, and was of particular interest because at operation the vena cava was torn. A clamp was applied to the lateral wall, and removed at the end of forty-eight hours with the patient under general anesthesia, and the wound widely opened in preparation for trouble. The clamp was slowly and carefully removed; there was no bleeding; the wound was reclosed with a light gauze drain, and the patient made a good recovery. In the third case the primary cause of the trouble was not elicited. A nephrectomy was followed by an uncomplicated recovery.

There was one case of papillary carcinoma of the kidney, which also involved the ureter. This was an advanced case, perhaps too advanced to be operable. There was a huge mass filling the left loin and

hypochondrium. However, we decided upon an abdominal nephrectomy, which was performed. The operation was extremely difficult; the patient was profoundly shocked; and while the kidney was removed we were obliged to abandon the operation without removing all the ureter as we had planned

Fig. 2.—Stricture of ureter, dilated ureter and renal pelvis.

to do. After recovery from his primary shock the patient made an uneventful operative recovery. One month later we operated again, hoping to remove the remainder of the ureter which we knew was involved. At this time the ureter was so bound down to the great vessels that it was obviously inoperable. The patient returned to his home and died four months later. The importance of removing the ureter as well as the kidney in these cases should be emphasized.

The two adenocarcinoma cases the patients were subjected to nephrectomy by the abdominal route. One made a good operative recovery and left the hospital in three weeks. One month later there developed a polyarthritis with endocardial involvement from which the patient died. No autopsy was obtained and it is impossible to say what, if any, relation the terminal condition bore to his renal tumor. The other patient made a good recovery and the patient is well to date, four months after operation—too early of course to have any bearing on the prognosis. In this case we were materially helped in our diagnosis as we have been in numerous instances, by pyelography. Because the neoplasm encroaches on the pelvis and calyces, it is shown as a filling defect in the pyelogram. This factor is considered of much greater diagnostic value than the socalled spiderweb arrangement which is often noted in the more advanced cases in which the diagnosis is obvious. A pyelogram of the kidney showed that the upper calyx was normal, the middle somewhat irregular, while the power calyx was entirely absent, its place being taken by the tumor of the lower pole, which was faintly outlined. Figure 1 shows the specimen removed.

There was only one case of hydronephrosis in our hospital admissions for the year. This occurred in a woman who applied for treatment because of profuse hematuria. She knew that for many years she had had a movable right kidney. The hemorrhage was traced to this organ which was practically void of function and showed a rather striking pyelogram. Nephrectomy was clearly indicated but was declined and the patient has passed from under our observation.

There were two operated cases of socalled unilateral nephritis. One was an adult male who for several years had complained of a dull aching pain in the right loin, which occasionally radiated along the ureter. The objective findings except for tenderness over the kidney were negative. The kidney was explored and nephrotomized. No gross changes were noted. This was an unsatisfactory diagnosis and it would perhaps be difficult to defend the operative procedure. Yet the patient was apparently relieved of his symptoms. This is one of a group of cases that is not well understood. The other case occurred in a woman of fifty who, in addition to lumbar pain, had had in the past year several copious hemorrhages from the affected kidney. At operation the cortex and cut surface showed numerous very small cysts. The kidney was removed. The rather long pathological report spelled chronic interstitial nephritis. The patient is well one year after operation with no indication of trouble in the remaining kidney.

There were four cases of nephroptosis upon three

Fig. 3.—Calculus in lower end of ureter; complicated by pyonephrosis requiring nephroureterectomy.

of which we performed nephropexy with entirely satisfactory results in all. This operation has, of course, been much abused and performed many times for no good indication. We wonder, however, if the pendulum has not swung too far. No com-

petent surgeon would operate upon a movable kidney which was giving no symptoms and which was discovered accidently in the course of a routine examination, nor would he operate for a prolapsed kidney which was simply a part of a general ptosis of all the abdominal viscera. However, there are not a few cases in which the prolapsed and movable kidney complicated by kinking of the ureter and beginning hydronephrosis can and, in our opinion, should be relieved by a well performed nephropexy.

There were three cases of pyelonephritis, one of the hyperacute type complicating an obstruction with calculus and accompanied by a profound general sepsis, demanding a prompt nephrectomy as a lifesaving procedure. One was of the subacute type and followed an attack of influenza. This case responded to conservative measures; vaccines, fluids, urinary antiseptics, and other forms of treatment. The other patient was admitted because of a mild hematuresis which was traced to the left kidney, from which we also obtained pus and pus casts with colon bacilli. This patient is still under observation and the pyuria persists.

There were six admissions for pyelitis; two bilateral and four unilateral. All showed colon bacilli in the urine. Some of the patients were admitted with a provisional diagnosis of calculus which was not demonstrated. It is our custom to treat these cases with pelvic instillations of mercurochrome-220. Our results have been moderately encouraging; in fact, many of these patients are markedly benefitted by simply passing a ureteral catheter, suggesting stricture as the underlying cause.

DISEASES OF THE URETER.

There were twenty cases as follows: Stricture, six; calculus, twelve; papillary carcinoma, one; ureterocele, one.

The six cases of stricture of the ureter were all relieved of their symptoms by dilatation through the cystoscope, and they all continued treatment as ambulatory patients after leaving the hospital, and have remained to date free from trouble. It seems to us that Hunner has made his point, and that stricture of the ureter is established as a clinical entity. Figure 2 is simply an illustration taken from a considerable number of cases, in most of which the patients were seen and treated in the office and dispensary.

Twelve patients with ureteral calculi were admitted to the hospital. Four of these were delivered by cystoscopic manipulation of one sort or another. Two in the upper ureter were removed through an incision in the kidney pelvis. In two cases there were extensive changes in the kidneys requiring nephrectomy. Another case illustrated in Figure 3 had the largest ureteral calculus we have seen and required the removal of the kidney and the entire ureter. This patient was admitted three months preceding the operation with almost complete suppression of urine. In addition to the calculus in the lower portion of the left ureter, shown in the cut, he had also a fairly large calculus high up in the right ureter. This was removed by pyelotomy and he returned later for the nephroureterectomy on the left side. Four months after operation he was in good health, although there was still pus in his urine. One patient was admitted with multiple small calculi in the stump of a ureter left after a nephrectomy performed twenty-five years before for calculus pyonephrosis. This patient was a woman of fifty-three who had had trouble since her nephrectomy—frequent attacks of pain referred along the course of the ureter, accompanied by chills and fever. These attacks had become very frequent in the past year and lasted two or three days. They were relieved by the passage of very turbid urine. The condition was readily demonstrated by cystoscopy and ureterography. At operation about ten inches of much dilated ureter filled with mucopurulent débris and calculi was removed through an extraperitoneal incision. There was also present a large uterine fibroid which added materially to the difficulty of the operation. She made an excellent recovery although she still has some bladder symptoms which we believe are caused by pressure of the fibroid tumor.

Two patients passed from under our observation with their calculi still in the ureter. All the other patients in this group have remained well to date.

There was one papillary carcinoma of the ureter subjected to exploratory operation and found inoperable.

There was one ureterocele which presented at cystoscopy a soft cystic mass about the size of an English walnut. The ureteral opening was posterior to the tumor, near the bladder wall. Cystoscopic manipulations of all kinds failed to bring it into view, although the frequent collapse of the tumor and a whirl from behind it indicated its presence and its location. A suprapubic cystotomy and a plastic operation on the lower end of the ureter were performed. There was present a pyelitis, but the kidney showed an excellent phthalein output. The patient returned to the hospital three months after operation with an acute exacerbation of the pyelitis, which subsided with conservative measures. He has since passed from under our observation.

DISEASES OF THE BLADDER.

There were twenty-three admissions as follows: Papilloma, one; carcinoma, five; ulcer, two; cystitis, four; calculus, two; urethrotrigonitis, three; suprapubic fistula, three; diverticulum, two; foreign body, one.

Almost all of our papillomas are treated as ambulatory cases by means of fulguration. One patient was referred for open operation because he did not respond to fulguration. At operation a small soft tumor presenting all the earmarks of benign papilloma was excised with the cautery. The pathologist reported papilloma. However, six months later there was a recurrence, and at a second operation the condition was found frankly carcinomatous. It would appear that any bladder tumor which does not respond to fulguration is, to say the least, potentially malignant.

There were five admissions for bladder carcinoma. Of these four patients died in the hospital; one, three days after admission, no operation having been performed. One case was complicated by extravasation and urinary sepsis, following a cystotomy and radium treatment at another hospital.

A suprapubic cystotomy was performed and an effort made to drain the infected tissues, but the patient died in twenty-four hours from sepsis. One died from apoplexy ten days after a cystotomy and application of radium. Another died three weeks after the same procedure from exhaustion and a complicating double pyelonephritis. This was a very advanced case and operation was performed merely as a palliative procedure for the relief of pain. One patient left the hospital apparently improved after a cystotomy and radium treatment. He returned to his home in another state and has been lost track of. Another case treated similarly left the hospital apparently improved. However, he had an early recurrence, and was later subjected to a repetition of his previous treatment at another hospital. This patient at present, five months after his last operation, apparently has no further recurrence. This small group of cases well illustrates the formidable character of the lesion. Most of these cases unfortunately occur at a site which does not lend itself readily to radical excision. In the exceptional cases occurring at the summit of the bladder we believe that wide excision offers a very fair chance of cure. In the majority, however, radium applied through a suprapubic cystotomy wound seems to offer us our best chance of relief.

Of the ulcer cases, one was an extensive cystitis (streptococci demonstrated in the tissues) which was apparently cured by prolonged suprapubic drainage, after other measures had failed. The other was a small, punched out ulcer on the trigone seen in a woman who had had a nephrectomy for tuberculosis seven years before. The ulcer was apparently not tuberculous, and responded to topical applications of argyrol.

Four patients left the hospital with what would appear to be a rather unsatisfactory diagnosis of cystitis. In one case the cause was undetermined; one complicated a lesion of the central nervous system; one was a contracted bladder condition in a man who had been subjected to nephrectomy for tuberculosis several years before; and finally, a case occurring in a young man who had been in the past few years subjected to two cystotomies, one nephrotomy, and one perineal section in other hospitals. He came in with a contracted incontinent bladder. We were unable to discover the indication for his previous operations, nor were we able to relieve his present condition.

There were three cases of urethrotrigonitis in women. We believe that most of these cases fall in two groups; first, those caused by urethral stricture, and second, by some form of sexual psychopathy. Cases in the first group are much improved by urethral dilatation. The others are very intractable to any form of treatment.

There were three persistent suprapubic fistulæ, all following prostatectomy. Two closed after rest in bed with an indwelling catheter. One case was complicated by a very large ventral hernia. The hernia was repaired and the fistula closed with an excellent result.

Two diverticula of the bladder were excised according to the method outlined by Rathbun (1) with complete cure.

The foreign body was a wax taper introduced by a young man through his urethra for reasons best known to himself. It was found rolled into a ball and encrusted with urinary salts, and was removed by suprapubic cystotomy.

DISEASES OF THE PROSTATE AND VESICLES.

There were thirty-eight admissions as follows: Benign prostatic obstruction, twenty-eight; carcinoma of the prostate, five; chronic prostatitis, one; prostatic abscess, two; acute seminal vesiculitis, one; chronic prostatovesiculitis, one.

Of the twenty-eight cases of benign prostatism, one patient was sent to another institution two days after admission because of an unmanageable psychosis. One patient died seven days after admission for cardiorenal insufficiency, no operation having been performed. One patient died five days after preliminary cystotomy, from an acute cardiac dilatation. The other twenty-five patients were subjected to suprapubic prostatectomy, seven in two steps, the remainder at one operation. We prefer the one step operation whenever the patient will tolerate an indwelling catheter. We use local anesthesia to the point of enucleation. Nitrous oxide is used during that procedure, and is stopped the instant the enucleation is completed, so that the patient is conscious while the wound is being closed. This is felt to be an important part of the technic. There was one death in this series of twenty-five (hemorrhage on the second day—packing—renal insufficiency—death on the seventh day). In one patient there developed complete retention after the suprapubic wound had closed. On cystoscopy was found a median bar left at the site of the prostatectomy. This was fulgurated, with complete restoration of function. One case (a two step) had a rather late prevesical infection requiring incision and drainage. The other patients made smooth recoveries.

The shortest stay in the hospital was one of twenty-seven days; the longest (the case of prevesical infection), seventy-five days. The average stay was thirty-four days. Prostatectomy for benign obstruction in properly selected and properly prepared cases would seem to be a relatively safe procedure.

Of the five patients with prostatic carcinoma, one died five days after admission (no operation being performed), two patients died following partial prostatectomy, one on the fourteenth day from uremia, and one on the twenty-second day from a double pyelonephritis. The other two made good operative recoveries. One has been lost track of, and one, six months after operation, was fairly comfortable, although obviously not cured. All these patients suffered from complete retention. One had radium applied with needles through the perineum before operation, two after operation. The results of treating cancer here, as in other parts of the urinary tract, are, to say the least, not brilliant.

Perineal section was done for one prostatic abscess; the other ruptured spontaneously into the urethra. We believe that the majority of these patients will recover in this way if treated conservatively. We have very few hospital admissions for this condition inasmuch as we have no venereal beds.

We see a considerable number in our outpatient department. They are given stock vaccines and advised to stay in bed at home, and to take hot sitz baths. Most of them return in a few days reporting a copious discharge with relief of other symptoms.

There was one case of acute seminal vesiculitis following influenza and complicated by retention.

Seminal vesiculotomy was performed upon one patient. This man had a systemic infection with repeated attacks of iridocyclitis, eventually resulting in almost complete blindness. A short chained streptococcus was isolated from the vesicles. Vesiculotomy was performed after all other measures had failed to stay the progress of the disease, and had apparently had very little if any influence upon it. This was a tragic case and illustrates one of the extreme possibilities of postgonorrhea vesiculitis.

Six cases of urethral stricture were admitted. Three of the patients had acute retention relieved by filiform and tunneled sounds, and were referred to the dispensary for continued treatment. We believe that uncomplicated stricture never requires operation. The other three cases were complicated by extravasation of urine. In one of the patients the extravasation occurred two days after suprapubic puncture. The other two men presented the usual picture of multiple sinuses and abscesses in the perineum and scrotum. These patients were operated upon and made good recoveries.

There were four cases of phimosis, one of paraphimosis, one punctured wound of the penis, and one carcinoma of the penis. This patient submitted to radical removal. Ten months after operation he was well and apparently free from recurrence.

DISEASES OF THE SCROTUM.

Four patients with varicocele and five with hydrocele were subjected to operation for radical cure. There were five epididymectomies for tuberculosis. Our attitude in the treatment of these cases has been conservative. Ordinarily operation is not advised except for persistent sinuses. Most of these patients have demonstrable lesions in other parts of the seminal tract, which can only be treated surgically by an extensive and radical operation with which we have had no experience. In operating we aim to conserve the testes. However, in one case occurring in an elderly man, we did a complete orchidectomy. The testes appeared normal, but on section showed numerous tubercles. We were rather surprised at this finding, and feel that perhaps some of our other cases might have had similar lesions which went unrecognized. One nontuberculous relapsing epididymitis was subjected to excision. One nontuberculous abscess of the testicle was incised and drained, and one traumatic epididymitis was healed by conservative measures. One orchidectomy was performed for a tumor of the testis which proved to be a gumma. This man had a negative Wassermann before operation. When the pathologist reported his findings another Wassermann was done and found to be four plus. This suggests the advisability in cases of doubtful tumors of the testicle of trying the therapeutic test before operation —even in the presence of a negative Wassermann. In one case of cryptorchidism, the patient was operated upon, with excellent result one year after operation.

One hundred and sixty-nine cases of syphilis were admitted one or more times for a test of the cerebrospinal fluid and for intraspinal therapy when indicated. Every patient with syphilis coming under our care has, at some time, a test made of the cerebrospinal fluid. This test comprises a Wassermann, globulin, cell count, and colloidal gold test. We employ the Swift-Ellis technic as a routine, and have been much gratified with the results obtained. This phase of our work has been discussed at length by one of our associates, Dr. Philip Goldfader, in a recent number of the New York Medical Journal. We had one fatality in this series. This was a young man with early cerebrospinal syphilis, who, one week previously had been given a Swift-Ellis treatment with no reaction. Eight hours following his second intraspinal injection he developed a severe chill followed by hyperpyrexia and delirium. He died forty-eight hours later with evidences of respiratory and circulatory failure. No autopsy was granted. There is evidently a risk attached to the procedure, although judging from the large number of patients treated with no reaction or disturbance following, it would not appear too great.

CYSTOSCOPIES.

In the cystoscopy room 378 cystoscopies were performed for the purposes of diagnosis and treatment. This is exclusive of cystoscopies performed in the outpatient department. The following conditions were diagnosed and treated.

Kidney: Renal calculus, nine; pyonephrosis, five; pyelonephritis, seven; nephroptosis, eleven; tuberculous pyonephrosis, two; unilateral nephritis, two; pyelitis, sixteen; hydronephrosis, nine; undiagnosed tumor, one; hypernephroma, one; adenocarcinoma, three; papillary carcinoma, one; horseshoe kidney, one; double kidney pelvis, one; anomalous kidney pelvis, one.

Ureter: Double ureter, one; stricture ureter, ten; kinked ureter, eight; pyoureter, one; calculus ureter, thirteen; papillary carcinoma, one; prolapsed ureter, one.

Bladder: Urethrotrigonitis, nine; postoperative tuberculous ulcer, one; postoperative tuberculous contracted bladder, one; postoperative cystitis, two; cystitis, primary ?, one; ulcerative cystitis, two; carcinoma, one; papilloma, one; diverticulum, two; stone, one. Extravesical conditions causing urinary difficulty, four.

Prostate and urethra: Benign prostatic obstruction, six; carcinoma prostate, two; chronic posterior urethritis, twenty; caruncle urethræ, one; polyp urethræ, two; papilloma posterior urethra, one; chronic prostatitis, two.

This list is prepared mainly for the purpose of showing the relative proportion of the various lesions included in this group, and is submitted without further comment. We follow a routine of examination in this department, which has been described in the New York Medical Journal (2).

We still follow this routine and are well satisfied with the results obtained.

In our outpatient department we administered 26,210 treatments to 1,689 patients. Our clinic

operates daily from 1 p. m. to 3 p. m. for all genito-urinary cases excepting syphilis. There is a syphilis clinic, for men only, one morning a week, from 9 a. m. to 12 m., and a similar clinic for women and children on another day, at the same hour. In addition to the above, there is a pay clinic from 5 to 6:30 p. m. corresponding to our 1 p. m. free clinic, and also pay clinics for syphilis one day a week each for men, and for women and children at 8 p. m. The revenue derived from this source is divided between the hospital and the doctors. The amount accruing to the hospital from this arrangement makes the clinic selfsustaining. The money paid to the doctors makes a small incentive for regularity in attendance. The men who work in the pay clinic must also work in the free clinic.

In this department we administered 2,058 intravenous injections of arsphenamine, and we have to report one fatality. This was a young woman with secondary syphilis. Examination of the heart, lungs, and urine had been negative. One week previous she had received four tenths grams of arsphenamine with no reaction other than a slight nausea. Almost immediately following her second dose which was of the same amount and the same type, and was given with the same technic, alarming symptoms developed and she died in thirty minutes in spite of all our efforts. The cause of death was anaphylaxis, following an intravenous injection of arsphenamine.

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The Operating Room*

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The term surgical technic is broad enough to embrace all the mechanical processes of surgery; usually, however, it is employed to comprise the manual and instrumental steps of a surgical operation. Thus, when we speak of a surgeon's technic we mean the system and details evolved by his particular style of operating. After several years of painstaking attention to minutiæ, both of preparation and of performance, an operator acquires command of details and his fingers have become accurate and systematized for certain motions—he now has technic. Of course, the quality of this technic varies with the man. I have not mentioned speed, because I believe that speed is more the casual end result of technic than its absolute *sine qua non*. An operator may possess splendid technic and yet operate slowly and deliberately; it is quite within the realm of possibility for an operator to remove an appendix or an ovary rapidly and with poor technic. As a rule, however, the hands of the master of technic make the fewest possible movements in the performance of a given act, while the beginner or occasional operator proceeds with an *ubinam gentium sumus* manner, which results in loss of motion and waste of time.

Does the possession of technic alone constitute a surgeon? He who would be a surgeon should aspire to the acquisition of such accomplishments as precision in cutting, dexterity in ligating and skill in suturing, which, after all, are but manual processes to be mastered by practice. The surgeon must not only have technic, or what Treves (1) has called "the actual manipulative part of surgery," but he must also be skilled in diagnosis, know surgical principles, attempt prognosis, possess judgment and be proficient in aftertreatment. The surgeon either knows or, at least, makes an honest attempt to find out why he is operating; considers the reasons for and against such a procedure; ponders over the possible aftereffects. Whether he operates or not he shuns the sins against surgical principles. Having begun an operation he has sense enough to know when to stop. After an operation his interest in the patient does not lag, but he conducts the aftertreatment with vigilance and a sense of his deep responsibility. Hence it would seem that in the composition of the surgeon there is more philosophy than technic; more mind than hand. If I may again quote from Treves (1): "A shakiness of the hand may be some bar to the success of an operation, but he of a shaky mind is hopeless."

In 1804 Benjamin Bell complains: "Accordingly, in different hospitals we daily meet with good operators, but we do not often find surgeons possessed of that knowledge in the prognosis of chirurgical diseases which might be expected, that attention being seldom bestowed which is necessary to attain it" (2). Over a hundred years later Richardson (3) writes: "Some men have good judgment in the advising of operations, with but little skill in performing them; others have bad judgment in the advising of operations, but splendid technic in performing them; still others are not only poor diagnosticians and men of bad judgment, but they are clumsy operators." It is far from my purpose to minimize the importance of the mechanics of surgery. I am striving to accord to surgical technic the exact place in the domain of surgery to which it is entitled. I believe with Horsley (4) that "a beautiful operation that results in the death of the patient is not satisfactory surgery. While the mechanics of a surgical operation are important, they should not dominate the situation. The object of a surgical operation is to save life, to relieve pain, and to restore function, and these three things, in the order named, should always be kept in mind. The technic of an operation should be

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chosen not solely because it appeals to a mechanical sense, but because it is biologically correct. The changes and reactions of tissues after operation must be borne in mind when selecting the technic for any surgical procedure. It cannot be too often emphasized that surgery should be more a science than an art. A surgeon who is a dexterous operator and who skilfully amputates a leg that with patience and scientific application could be saved, is merely a good artisan, and is distinctly inferior to the surgeon who could save the leg even though he should be a bungling operator."

When the hospital consists of several stories the operating room should be located on the top floor to facilitate the entrance of the northern light through the skylight, to protect other patients from the irritating noises incident to a surgical operation, and to minimize the amount of atmospheric dust—since the air near the ground contains more solid particles than the air surrounding the roof. The problem of lighting is among the first encountered when planning the operating room. For operations performed during the day time most authorities agree that the operating room should have illumination both from skylight and from window light. Perthes (5) says that even though the overhead light will suffice for most operations, the combination of vertical and side illumination is to be preferred; and for certain operations, as on the perineum, the side light is indispensable. "If one must choose between overhead light and side light it goes without saying that he will select the overhead light" (5). In this latitude the northern light is the most desirable. As Beatson (6) says, "From the north we get the steady, even light that the artist and the photographer prefer, whereas a southern aspect furnishes too direct and too powerful rays which embarrass operator and spectator—partly by the glare in his eyes and partly by the tissues in the depth of the wound being thrown into shadow." Light, however, exclusively from the north, may have its disadvantages, as shown by an experiment in the Massachusetts General Hospital. The staff of that institution, according to Wheelwright (7), insisted that all sunlight should be excluded and only the northern slope of the skylight was glazed and this was given a pitch of 71°. On hazy or cloudy days the light was reflected back into the room, but on bright cloudless days there was no such reflection and the light was found to be insufficient. They then corrected this defect by admitting light from a third of the area of the southern slope of the skylight. Wheelwright believes that in the small, north lighted operating rooms the window and skylight should be continuous, as in studio lighting. Sargent (8) calls attention to a very practical consideration when he remarks: "The greater the window area, the more difficult will be the problem of maintaining the proper temperature of the room." The same writer (8) does not believe that the temperature of the operating room should be allowed to fall below 65° F. Da Costa (9) states that the desirable temperature is 78° to 80° F. and that over 80° F. is too warm for both patient and surgeon. According to Gask and Wilson (10) the temperature of the operating room ought to be 65° to 70° F., or even higher. Ochsner (11) holds the ideal temperature to be 80° F. and Gibbon (12) considers "about 75° F." the proper temperature for the operating room. Before leaving the subject of natural illumination it is helpful to consider the advice of Haubold (13) who reminds us that "The skylight should be permanently sealed, as the ropes or reach rods necessary to open and close windows will, when manipulated during an operation, shake dust into the operative field. As moisture gathers on the under surface of a skylight, it should be furnished with a gutter at its dependent portion."

Profound thought and much money have been expended on the operating room's artificial illumination for night and for dull days. The great metropolitan hospital usually is provided with its own plant for the generation of electricity, but, even here, there have been irritating instances of the surgeon being suddenly left in utter darkness while in the middle of an operation—because the entire illumination of the operating room depended on a single fuse which failed. To avoid such accidents we should use several fuses connected with different groups of lights and regulated by separate switches. Of course, the failure of electricity may be due to conditions remote from the operating room and cause darkness throughout the hospital. To provide against complete failure of electricity every operating room should have in its equipment acetylene lamps and a plentiful supply of candles. "A collection of candles congregated on a board" (12) will serve admirably in an emergency. Acetylene must be used with care as there is some danger of explosion. If ether is present in the room any open flame must be placed high up "as ether vapor is heavier than air, and no explosion is possible until it reaches the level of the flame" (9). If illuminating gas is the source of light, the use of one of the various incandescent mantles will improve the quality of light as well as reduce the quantity of carbon dioxide and smoke (14).

Many excellent, even ingenious, methods of artificial lighting have been devised for the operating room. It will suffice briefly to refer to a few. The elaborate system invented by Leitz (15) has been used at Strassburg where it was installed about nine years ago. Here the light comes from an arc lamp stationed outside of the operating room and first strikes a parabolic reflector which transmits it through an opening in the wall of the operating room. Here it goes forward as parallel rays to be cleverly deviated and reflected by a hexagonal pyramid of reflecting surfaces and mirrors until it finally reaches the operating table where it illuminates an area of twelve to sixteen inches. In this light hands move without casting shadows. Bartlett's (16) method of illuminating the operating room was evolved after he had focused several automobile headlights on the field of operation.

Much inventive skill has been displayed in behalf of those who would witness surgical operations. Some years ago Balfour (17) described a mirror used in the Mayo clinic. This mirror was suspended over the operating table at such an angle as to give the spectator a view of the operative field. Of course, if the operator was right-handed his image appeared left-handed. Lesser (18) invented a sys-

tem by which a surgical operation could be viewed through a mirror. Duncan's (19) "apparatus for providing with a complete view, and for securing photographs and moving pictures of operations" consisted of a camera, a mirror and a skillful arrangement of lenses. I believe with Gibbon (12) that none of these various systems of reflecting light by mirrors or of focusing light by metal reflectors compares in satisfaction with the overhead light. In order to avoid shadows the overhead light should come from several separate sources—"from an overhead collection of incandescent lights" (12). The danger of dust contamination from overhead lights may be greatly mitigated by the use of swing arms for the fixtures so that during the day the entire lighting apparatus may be pushed away from the region immediately over the operative field. No matter what type of fixtures is used—let it be as simple as possible. Both glass and metal should have daily application of a moist cloth.

The ventilation and heating of the operating room are difficult subjects to discuss without referring in some measure to the air as a factor in wound infection. After it had been established that contact was the chief cause of wound infection and that the air as a source of such infection was relatively unimportant, most surgeons concentrated their energies upon preventing anything bacteriologically unclean from touching the wound and almost ignored the air in planning their technic. They thought: "Actual contact of an unsterile object with the wound is the main cause of infection. Danger from the air, while not absolutely absent, is insignificant." Most of them, thereupon, ceased to take the air of the operating room seriously. This has not been the attitude, however, of some of the English writers, who emphasize the importance of mechanical ventilation with washed or filtered air.

Howard (20) informs us that at the London Hospital the air is washed by passing it through water, and then filtered through seventy-two screens of asbestos wool. "After being warmed by a steam radiator," he writes, "it enters the theatre through a special shaft, and is practically sterile. Before operations, superheated steam is blown over the theatre in order that any microorganisms may be killed, and the surfaces of the walls, benches, tables, etc., are damp. This dampness prevents the dust from being disturbed by people moving about." (20) Sargent (8) describes the Plenum system, as used at St. Thomas's Hospital: "An equable temperature is obtained without the presence in the theatres of complicated hotwater coils, and the absence of these means greater ease in maintaining the scrupulous cleanliness which is essential in a modern operating theatre; for not only is the air free from fog and dust, but there are fewer crevices where dirt may lodge than in theatres heated by watercoils. The essential feature of the Plenum system is that air adequately warmed and deprived of its grosser impurities, such as soot and fog, is forced by means of a rotary fan into the rooms, from which it can only escape by a system of ducts which lead to the open air. The pure air inlets are at some distance from the floor, the air in emerging from them being given an upward direction, while the extract ducts are near the floor; the air must therefore pursue a downward course in passing out of the rooms. The inlet and outlet ducts are so placed in the theatre that the general trend of the air is from the patient towards the spectators. There is no attempt at extraction, but since there is a slight plus pressure in all the rooms and the air will naturally find its way to the open by the outlet ducts, there is no fear that foul or foggy air will be drawn in through cracks or doors, for, even if a door is opened, the pure air will rush out but no unfiltered air will gain admission. The rooms containing the cleaning, warming, and air propelling apparatus are situated on the floor above the theatres. The air first passes over a series of steam pipes, next through a double screen formed of coconut fibre continually kept moist by running water, thence over the principal heating pipes, till it reaches the fan. The steam pipes will of course be used only in cold weather, while in summer the wet screen will somewhat cool the air which will have arrived at the fan freed from its grosser impurities and of a desirable temperature" (8).

Ochsner and Percy (14) tell us that artificial ventilation "may be accomplished by removing air in the room by means of fans, or through heated flues in which a draft is caused by the fact that hot air rises, because of its decrease in weight, due to expansion. The space occupied by the air removed from a room by either of these methods will be filled with air coming from without, either through openings provided at points at which the cold air has to pass over heated radiators, or through a main duct above the roof and necessary heating coils below to a settling chamber and then by smaller ducts to the various rooms. Another method consists in forcing air by the use of fans through a chamber heated by coils, thence through flues into the various rooms and wards. This plan may be employed alone or in combination with the methods just mentioned, by means of which the bad air is drawn out of the rooms. But this method has among its leading drawbacks this, that a constant temperature cannot be maintained, owing to external and internal variations and conditions. (There are always air spaces which contain air that can be displaced only with difficulty, while there are other spaces in which the air can be changed easily, consequently the fresh air will constantly be forced into spaces which are least in need of change, while other portions of the room will continue to contain vitiated air)." (14) The same authors consider that the best means of filtering the air are the means provided by nature. "Air which has been carried across a large body of water is practically free from impurities, because these have fallen into the water. Air near the tops of high mountains is pure because impurities fall to the ground before they are carried to these great heights. In tall buildings there are more microorganisms in the air entering from without in the lower than in the upper floors." "For these reasons," they continue, "it seems wise to obtain as large a piece of land as the means will permit, in the highest available location, and then construct the building as near the centre of such area as

possible. The higher the building the better will be the chances of obtaining good air for the greatest number of patients. Shrubs and trees planted between the building and surrounding streets will serve to filter a considerable portion of the street dust out of the air before it reaches the building" (14).

The methods of air filtration described above are but the legitimate and logical results of Lister's antiseptic system. Originally a carbolic acid spray was used for the purpose of destroying the air germs of the operating room; today, filtration attempts to exclude such organisms from the air of the operating room. Inspired by Pasteur's studies on fermentation (21) and on spontaneous generation (22) Lister (23) (24) evolved a technic in which the air was considered to play the important rôle in wound infection. Lister did not aver that he was the first to use carbolic acid surgically. Indeed, in his letter, dated September 28, 1967, and appearing in the *Lancet* on October 5th of the same year, he says: "For my own part, I may say that, of all the gentlemen from Great Britain and both continents who have recently visited Glasgow, not one has ever expressed the slightest doubt that the system in question was entirely new; the novelty, I may remark, being, not the surgical use of carbolic acid (which I never claimed), but the methods of its employment with the view of protecting the reparatory processes from disturbance by external agency."

Several authors had used antiseptics before Lister's time. Agostino Bassi demonstrated the parasitic origin of silk worm disease in 1836 and Da Costa (9) tells us that Bassi used corrosive sublimate in the treatment of wounds several years before the birth of the carbolic spray. Oliver Wendell Holmes (25) in 1843 read a paper on the contagiousness of puerperal fever. Ignaz Philipp Semmelweis (26) in 1847 in his communication entitled "Most Important Experiences Relating to the Etiology of Epidemic Puerperal Fever in Lying in Hospitals," recommended that obstetricians wash their hands in a solution of chloride of lime. According to Reclus (27) Boinet used the word antisepsis in his *Treatise on Iodotherapy,* published in 1855, and he had found empirically that "the tincture of iodine, applied to old or recent wounds, may prevent or arrest purulent absorption." Da Costa (9) writes that Jules Lemaire in 1863 advocated the employment of carbolic acid in wounds in order to destroy germs; and quotes Monti (*Modern Pathology*) as authority for the statement that Bottini in 1866 used carbolic acid in suppurating and putrid wounds in the belief that germs were responsible for these conditions. With the exception of Boinet, the authors mentioned above used antiseptics with a more or less confused idea of the microbic origin of pus in wounds. Before Lister's time, however, there were many surgeons, who, having not the slightest conception of the parasitic source of suppuration, nevertheless chanced upon remedies now known to be antiseptics. Mumford (2) reminds us that the Good Samaritan poured oil and wine into the wounds of the stranger. The same pleasing author tells us that Paracelsus, who was born in 1493, employed silver sutures and lead washes; that Ambroise Paré (1510-1590), Fallopius (1523-1562) and others used alcohol washes; and that Sir Astley Cooper (1768-1841) applied bichloride of mercury in solution to ulcers and sinuses. Both Mumford (2) and Da Costa (28) declare that Dominique Jean Larrey (1766-1842), Napoleon's surgeon, treated suppurating wounds with *eau de labarraque* (solution of chlorinated soda).

Even though antedated by several surgeons in the use of antiseptics, the credit of inventing a system for the purpose of preventing wound infection belongs to Lister. Lister, acting independently and in ignorance of the work of a few others who had applied antiseptics in a haphazard fashion, excogitated the system which is the foundation of the present day asepsis. Bardeleben admirably sums up Lister's position in regard to antisepsis: (I translate the quotation used by Watson Cheyne) (29) "It has long been known, not only that a magnet attracts iron, but also that if a galvanic current be conducted through a wire encircling but not touching an iron bar, the iron bar becomes magnetized; but, nevertheless, the application to the telegraph of these facts—that an iron bar which has been magnetized by a galvanic current draws iron—constituted a discovery. So it is with the farreaching advance for which we must thank Lister. Joseph Lister has discovered neither bacteria nor carbolic acid, but, with enduring consequences, he applied to living, especially to wounded human bodies, the fact that decomposition does not occur without the influence of bacteria suspended in the air. (To avoid botanical refinements he prefers to say germs.) The result of this application was also a discovery, well worthy of being listed among the greatest advances of the medical art."

Lister sought in the air the cause of suppuration. "If we inquire," says he (23), "how it is that an external wound communicating with the seat of fracture leads to such grave results, we cannot but conclude that it is by inducing, through access of the atmosphere, decomposition of the blood, etc." Further on in the same treatise (23) we read: "Turning now to the question of how the atmosphere produces decomposition of organic substances, we find that a flood of light has been thrown upon this most important subject by the philosophic researches of M. Pasteur, who has demonstrated by thoroughly convincing evidence that it is not to its oxygen or to any of its gaseous constituents that the air owes this property, but to minute particles suspended in it, which are the germs of various low forms of life, long since revealed by the microscope, and regarded as merely accidental concomitants of putrescence, but now shown by Pasteur to be its essential cause, resolving the complex organic compounds into substance of simpler constitution, just as the yeast plant converts sugar into alcohol and carbonic acid." In another paper (24) he states: "In the course of an extensive investigation into the nature of inflammation, and the healthy and morbid conditions of the blood in relation to it, I arrived several years ago at the conclusion that the essential cause of suppuration in wounds is decomposition, brought about by the influence of the atmosphere upon blood or serum retained within them, etc."

It is not strange that Lister reflected upon the atmosphere as the possible source of putrefaction, when we consider the number of practitioners who, centuries before him, suspected the air as the source of many maladies. Turning over the pages of Watson-Cheyne's so justly celebrated work (29) on antisepsis we learn that Paracelsus taught that air should not come in contact with a wound; that the evil effects of air were feared by Würtz who wrote in 1596; that Fallopius dreaded air in wounds; that Paré thought the harm not so much due to air as to miasms contained therein; that Magatus in 1616 strongly emphasized the danger of air; that Belloste in 1707 wrote against air contact; that Col de Villars in 1741 recommends that dressings be changed as quickly as possible in order to lessen exposure to air; that Heister (1683-1758) attempted to prevent the entrance of air into wounds; that Pringle as early as 1761 feared the bad influence of air; that Benjamin Bell in his treatise on ulcers, published in 1784, speaks very strongly on the pernicious effects of air; that Hugh Munro, in 1792, entertained similar views; that Alexander Munro in 1788 wrote that the air was bad for serous sacs, chiefly because of its coldness, and in 1790 spoke of the impurity of the air; that Boyer in 1844 ascribed certain bad results in the treatment of wounds to the action of air.

Watson-Cheyne (29) writes that Delpech in 1816 made the first attempt at conducting an operation under the skin and performed subcutaneous tenotomy for the expressed purpose of preventing the contact of the air with the divided tendon; that Benjamin Brodie in 1817 divided varicose veins subcutaneously; that in 1839 Jules Guérin ascribed the good results of subcutaneous surgery to the exclusion of air from the wound; that Stromeyer performed his first subcutaneous tenotomy in 1831 and wrote his first report on the subject in 1833, clearly stating that the object of his operation was the exclusion of the air. According to Watson-Cheyne (29), various methods of excluding air from the wound (occlusion) had been tried not only by the ancients but also by more recent surgeons; and of the various materials employed for the purpose of converting open wounds into subcutaneous ones (gold beater's skin, caoutchouc, etc.) Jules Guerin, in 1844, considered gold beater's skin the best; the same year Langier wrote a paper "on the successful use of mucilages of gum Arabic and of gold beater's skin in the treatment of suppurating wounds"; almost synchronously (1844) Chassaignac advanced an identical method, claiming priority over Jules Guérin and declaring that under this method he, Chassaignac, had never seen a single case of hospital gangrene, phlegmon or erysipelas.

Rochard in his *History of French Surgery* (1875) comments entertainingly on Chassaignac's statement. Watson-Cheyne (29) quotes Rochard's remarks: "It is somewhat amazing to read similar assertions made of each new method which appears. Were we to take such statements literally we would be obliged to conclude that untoward results after wounds ought to be almost unknown in the hospitals of Paris, seeing that all the surgeons who practice there pride themselves on avoiding them by the method which they have adopted. On this point, however, it is difficult to know what to believe; and, as far as the diachylon dressing is concerned, Broca recalled having seen a woman die of erysipelas at Lariboisère, in the service of the inventor of the method, after she had been dressed in this manner following removal of the breast. Furthermore, Chassaignac did not hesitate to change his treatment by introducing there a new principle which speedily absorbs all the rest: we refer to surgical drainage." (I am responsible for the translation.) Chassaignac, usually credited with the introduction of the practice of drainage into surgery in 1859, never asserted that he had invented drainage. Le Dran (1685 to 1750) is quoted by Mumford (2) as saying: "The only cure for empyema is to operate and drain with a catheter." Le Dran, according to the same author (2), taught his students to leave open the lower angle of a deep wound. Mumford (2) further tells us that Benjamin Bell always used hollow drainage tubes in deep wounds and sinuses where there was pus and drained liver abscesses by strands of lint wicking; and that De Vigo, who wrote in 1514, used capillary drainage by means of wicks.

Previous to Chassaignac's time nobody had conceived of such a vast system of drainage, applicable to most pus cases and feasible in each region of the body. He systematized drainage and formulated minute instructions for its use. Let us read what Chassaignac (30), himself, has to say on this subject: "My investigations have been not only of the pathological history of suppuration but also and chiefly of the therapeutic side of the question, and I hoped to find better principles of treatment in the use of that which I call surgical drainage." "On the one hand, I have shown the possibility of directly changing purulent secretion into plastic secretion, making feasible primary union of the walls of an abscess; on the other hand, by availing myself in some measure of Gariel's tubes, I have extended their use to the treatment of the vast majority of purulent cases. The idea of substituting fenestrated, India rubber tubes for the ordinary Seton's belongs to me in a certain sense only. Ferri, M. J. Cloquet, M. Baudens, etc., used either fenestrated metal tubes or elastic cannulas. That which does belong to me is the conception of the greatest system of canalization ever applied to pus cases, together with exact and detailed instructions as to method of use for each region and, almost, for each individual step. All the germs of the invention of the means of drainage existed but the most inadequate ones were chosen and insisted upon by practitioners. The result was that, having devised neither the solid nor the hollow Seton nor lateral perforation of tubes, I was the first to use in practice, on a scale before unknown, these drains derived from Gariel's tubes." It is quite probable that by Gariel's tube Chassaignac meant the hollow rubber pessary which could be inflated and which was presented to the profession by Maurice Gariel (1812-1878).

To return to the subject of the influence of air on wounds, the elder Gross (31) informs us that collodion was introduced as a surgical dressing by J. P. Maynard of Boston in 1847—shortly after Jules Guérin and others began their experiments with gold beater's skin, etc. According to Watson-

Cheyne (29), Jules Guérin in 1866, Maisonneuve in 1867 and Lannelongue later devised pumps, the object of which was to keep the gases of the air away from wounds. These all failed and Alphonse Guérin in 1871 introduced his cotton wool dressing (*Pansement ouaté*) which was a method of occlusion, and far from aseptic, in the sense in which we use the term today. A. Guérin hoped that the cotton wool would act as a filter and thus exclude the noxious miasms from the wound (29). Mortality was high during the siege of Paris and Hervey, writing in 1871, tells us that from September, 1870, until February, 1871, A. Guérin saved but one case of amputation. Later (1875) Pasteur pointed out that bacteria and their spores were present in the cotton wool when applied and could be easily found in the discharge (29).

In 1878, Robert Koch in his *Researches on the Etiology of Wound Infections,* defined the microorganisms of several definite surgical diseases and gave the pathology of each, having cultivated the causative bacteria through repeated generations either artificially or in animals. The disappearance of the spray—now of but historical interest—was due to the growing conviction among surgeons that wound infection was due principally to contact of skin, instruments, dressings or foreign bodies with the wound—a view now held in most clinics. According to Carl Beck (32), a band of investigators, led by Koch, who studied this question from 1881 to 1888, decided that the microbes of the air were mainly of a harmless character. As Schimmelbusch (33) observes: "All the requirements for growth and multiplication of microorganisms—warmth, moisture, and nutrient media—are not present in the air, and for the schizomycetes, yeast fungi, and mould spores, the air is anything but a favorable place of maintenance." The same writer (33) quotes Stern who investigated the spray and found its purifying action very unimportant. Nor has the departure of the spray from modern surgical technic been deeply regretted by those who had suffered either locally or generally (dermatitis, carboluria, etc.) from exposure to carbolic acid.

Hektoen (34) writes that true dust infection demands that the bacteria involved withstand drying so as to be carried by the air currents in our houses, hospitals, and operating rooms. Dry microbes of this sort constitute the danger of dust infection. Strong currents and mechanical disturbances of accumulated material may set in motion larger particles which settle down rapidly, whereas minute particles of completely dried material can remain suspended in the air for three or four hours (34). Hektoen tells us that Neisser and others have divided microorganisms into three groups with reference to their infective power when dust dried: A, those that cannot live in air dried dust and therefore are incapable of causing dust infection (gonococcus, influenza bacilli, pest bacilli and cholera spirilla); B, those that survive drying and consequently are able to cause infection when transported in the air currents within the average house, i. e., one to four mm. per second (tetanus bacilli, bacilli of tuberculosis, anthrax spores, pyogenic cocci, meningococci); C, those that withstand drying, but are scattered only by currents stronger than those in the average house (typhoid bacilli, diphtheria bacilli) (34). Flügge (35), in discussing the effect of drying on bacteria, says: "When considering the quality of air germs it is of the utmost importance to realize that many varieties of bacteria cannot withstand the degree of drying out necessary for their transit through the air in the form of the finest, flying dust. Take fine dust filled with selected bacteria. Submit this dust to an air current of four mm. speed and eight mm. in height (the rate of air motion in the interior of a well ventilated living room). Without exception the following will perish: Cholera bacteria, pest bacilli, pneumococci, meningococci, influenza bacilli, diphtheria bacilli. These can be carried a great distance through the air in the form of droplets only. On the contrary, the following remain alive in the finest dust under the same conditions: Bacilli of tuberculosis, anthrax spores, staphylococci, sarcina, tetanus spores. Typhoid bacilli and streptococci take a middle position; they can be transported alive on somewhat larger dust particles and by strong air currents."

Flügge has done so much work on the question of air as a source of infection that I take the liberty of quoting extensively from his chapter on air germs. Flügge (35) writes: "The sources of airgerms are the various surfaces on which colonies of bacteria have been established—principally the surface of the soil as well as clothing, skin and the superficial mucous membrane of man. Bacteria do not get into the air from moist surfaces by simple evaporation; or from fluids by weak air currents. If such an air current be induced over a fluid or moist substance containing a selected, easily recognizable species of bacteria, and if then a collecting tube, curved in several places, be passed, the tube will not contain any of the germs selected for the test. But if an air current of more than four mm. speed strikes upon the surface of the fluid so as to cause wave formation, and the bounding of the waves against solid surfaces results in spray; or if spouting of the fluid, as a result of violent beating or smacking, causes superficial bubbles, then droplets of water and with them microorganisms can be transferred to the air. In the open, droplets are detached by the surging of the sea, by mill wheels and very frequently when strong winds shake rain soaked tree leaves. In dwelling rooms these droplets can be formed whenever fluid is poured out—when washing, etc.; but, what is most important of all, both well and sick, by sneezing, coughing and loud speaking, almost continually fling away from the saliva and mucous of the respiratory tract demonstrable, minute droplets which can contain living microorganisms. Once let loose, the further spread of these droplets requires air currents of but slight force. Air currents of the speed of from one to two mm. a second can carry the finest droplets a meter aloft.

"After the drying out of a colony of bacteria the change whereby the germs get into the air is not effected without difficulty. The capsules and intercellular substance having been encrusted in a drying mucous or albuminous material, the bacteria cling to their underlying surfaces somewhat firmly."

(*To be concluded.*)

The Out Patient Clinic

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At the May meeting of the Associated Out Patient Clinics of New York, the status of the dispensaries was discussed from many points of view. As the subject appears to be of a good deal of importance, it may not be amiss to call the attention of the profession to the main features of the reforms which are intended to be introduced in the near future. I shall try to present the facts as they impressed me. I was not authorized by anybody to represent the above named body.

By taking a broad view of the subject, one must logically come to the conclusion that the out patient clinic is at least as important as the hospital ward, if not more so. The clinic is the place where overcrowding of the wards is to be prevented. The majority of the out patient clinic patients have as yet not reached a stage of morbidity which needs hospitalization, and by proper care should never be allowed to reach that stage. Prevention of disease is an important function of the community. The out patient clinic is one of the agents by which it may be accomplished, and certainly deserves consideration on the part of public spirited laymen and the medical profession.

It is suggested that more space must be allotted to the out patient clinic. A competent person possessing sound judgment should direct every new patient to the proper department. Such a person must have experience in classifying diseases. Old patients can be registered by anybody at all, but the newcomer is mostly unable to choose the proper department for himself, and must have somebody who is eligible to guide him; this is important especially where there are special clinics. A proper system of bookkeeping must be kept to receive, remit, and check up fees. Naturally, under such circumstances, there will be an increase in expenditure which will force the administration to raise the admission fees accordingly. There will be a stronger incentive on the part of the public to abuse their privileges, and many not entitled to charity may try to get treatment at the out patient clinic. Such abuses will have to be remedied by proper means.

The number of patients treated must be limited in proportion to the space allotted and the number of physicians employed. This limitation is important for the patient, who will be more carefully examined, and will also benefit the doctor by giving him an opportunity to study the case and become more proficient in his work. When a service becomes too large for one man to attend to, it may be split into two separate services or the overflow of patients may be directed to another institution. The latter remedy is certainly not the best and not the most desirable one.

Many out patient clinics at present find it difficult to procure proper attendance on the part of the physicians, as there is no inducement for them to work. The remedy for this inattention is somewhat complicated and farreaching, but it is hoped that in the near future matters will adjust themselves in the right direction. We may dismiss the idea of paid out patient clinic doctors, as so far this plan has not proved satisfactory for many reasons. For the present the following suggestions are made: The out patient clinic and the hospital ward are looked upon as two branches of one tree and the connection between the two is kept as close as possible. When a patient from the clinic is admitted to the ward, he is accompanied by the history sheet, laboratory findings, and remarks of the physician under whose care he has been up to that time. This system helps to avoid duplication of work. The out patient clinic doctor must visit the patient in the ward at least once a week, though he is no longer responsible for the treatment, morbidity and mortality of the case.

The same patient, on returning to the clinic for aftertreatment, is under the care of a physician who has been continuously in touch with the patient. By following up the case, whenever necessary, by a social worker in the home of the patient, the doctor is in a position to study his case thoroughly and thus benefit both himself and his patient. Every institution must strive to have a social worker of its own, until such time as it may avail itself of the workers connected with the municipal charities. The physician of the out patient clinic, having free access to the history chart of the case in the ward, combined with his own observations, will have a wonderful opportunity for study.

The securing of a uniform standard of treatment and the avoidance of friction among physicians and surgeons are important factors in work of this kind. For this reason it is advisable that the junior staff of the out patient clinic should be drafted as much as possible from the exinterns of the same institution. The interns are usually acquainted with the methods of treatment of their chiefs. To cement the close connection between the out patient clinic and the hospital ward, it becomes imperative to appoint the attending physician or surgeon in the hospital as the chief director of the out patient clinic, his assistants as assistant directors, and a junior worker as the regular attendant of the out patient clinic. The chief, or his assistant when so delegated by him, must visit the clinic not less than once a week, when the junior worker presents the more interesting and complicated cases which he has collected during the week. At stated intervals clinical conferences should take place. This arrangement definitely places the responsibility for the out patient clinic upon the chief director during his term of service.

The junior worker is profiting by the consultations and conferences. Besides, he is given the privilege of treating his private patients in the hospital without interference from the chief. He automatically becomes a candidate for appointment to the hospital staff whenever there is a vacancy in the respective service. Medical men who have tried this plan of

cooperation are very enthusiastic and predict great results from it. Of course, this is the ideal standard and will not be reached immediately, but a start must be made and made at once. The details, which are many, are to be worked out in the future. Such questions as vacations and substitutes for absentees for any cause must be left for future deliberation.

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The Tonsils*

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The tonsils are probably more frequently responsible for grave chronic ailments than any other organ of the body, and in attempting to understand their structure it is well to examine them from the viewpoint of the anatomophysiologist. I shall therefore present a résumé of the comparative anatomy and physiology of the tonsils.

ANATOMY AND PHYSIOLOGY OF THE TONSILS.

In all vertebrates, even the lowest, there is a collection of lymphoid tissue in the mouth. Birds, for instance, show a collection of lymph tissue in the throat, and reptiles, still more frequently, show a collection in the same region. Fish have a good deal of lymph tissue scattered about but not a distinct collection in the region of the base of the tongue. The horse has a rudimentary tonsil, not as compact as in man, and looks like a group of millet seeds. The horse is a nasal breather, the soft palate and uvula being so long as to separate completely the mouth from the nose. Peculiarly enough there is another animal dwelling in South America, the hyrax, which is also a mouth breather, due to the same elongation of soft palate and uvula, and this animal has the same rudimentary tonsillar tissue, or a large millet seedlike collection situated at the base of the tongue and at the upper part of the larynx and esophagus.

I wish to call attention to the fact that in animals that are pure nose breathers the tonsils are rudimentary, whereas in some of the other animals, which are pure mouth breathers or combined mouth and nose breathers, there is a more distinct and more compact tonsil. As far as I can find, no attacks of tonsillitis have been described in these animals. The tonsils of the cow are large and compact and instead of extending or opening into the pharynx, extend outward into the neck forming a large mass on either side. On looking into the mouth of a cow you cannot see the tonsils even though you pull the tongue out. The dog and his entire family, likewise the cat, the wolf, and the lion, have compact tonsils and capsules, just as in man, and some crypt formation. Attacks of tonsillitis are seldom or never seen.

Dr. Lentz, professor of anatomy in the veterinary department of the University of Pennsylvania (who has been kind enough to supply some of this information), states that he has found the tonsil inflamed in dogs only, when the nearby structures, such as the pharynx, were first irritated by the swallowing of some irritant, such as food that was too hot or a sharp spicule of bone. This irritation was followed by inflammation which spread to the tonsillar structure by contiguity. He has never seen pure tonsillitis without involvement of the nearby structures in any animal. The canine species are pure mouth breathers having large fauces and a correspondingly small soft palate and uvula. Dr. Lentz told me of a dog with a generalized lymphosarcoma involving almost every gland in the body and no tonsillar enlargement or abnormality on section, thus helping to show that even though the tonsil is lymphoid tissue, there must be come resisting power in it stronger than in ordinary lymph tissue. He also has seen several cases of Hodgkin's disease and no tonsillar involvement.

The pig has enormous tonsils, but as to attacks of tonsillitis, I could find none reported, nor could any veterinarian tell me of a case in which there was difficulty in swallowing due to disease of these structures. Rabbits also have fair sized tonsils, but no abnormality could be found in them. Monkeys, so very near to man in morphology at least, have tonsils, which macroscopically and microscopically are very similar to those of man, but I could find only one case of tonsillitis in these animals. Dr. Fox, of the Philadelphia zoological department, told me that he had never treated a monkey for tonsillar trouble. Many animals, including monkeys, have attacks of acute rhinitis with all the symptomatology seen in man, but no difficulty in swallowing due to tonsillar disarrangement. It is of course possible that animals may have attacks of tonsillitis more frequently than we give them credit, because of the enormous difficulties in communicating with them, and the difficulty in interpreting their symptomatology, thus overlooking such attacks or diagnosing them incorrectly.

Why disease of the tonsils occurs so frequently in man and so rarely, or not at all, in the lower animals, is a question of deep import, the solution of which will prove of infinite benefit to the human race. A common observation and one which I hope you will be impressed with as being important in our attempts to clarify the subject, is that the tonsils become more developed the higher we go up in animal life, reaching their height in man. What has man done, or what circumstances caused the growth

*Read before the Medical League of Philadelphia and the Brooklyn Pediatric Society.

of this organ in man during his stages of evolution? Let me now give a short history of the tonsillar studies by different investigators.

In 1543 Versol first described the tonsil. In 1724 Santorini first talked about the adenoids. In 1865 Wharton investigated the tonsillar region. Wharton, Shauffenberg and Morgagni spoke of the glandular tissue at the base of the tongue as tonsillar tissue. Raff describes a ring of adenoid tissue at the pharyngoesophageal inlet and compares it very well to that found in the wolf. Lacouchie is considered as the first one to give a complete description of the tonsil. Dr. Schmidt calls attention to the fact that the lymph tissue is not only limited to the region of the base of the tongue, but in other animals like the hog the entire "mouth is one mass of lymphoid tissue down to the esophagus." He apparently is trying to prove that this vast amount of lymphoid tissue is in this region for some protective purpose.

It remained for Luschka, however, to separate the different collections of lymph tissue at the base of the tongue and to describe so accurately the pharyngeal tonsil or adenoids, as to become honored by having his name attached to this organ. (The pharyngeal tonsil, adenoids, or Luschka's tonsil.) Waldeyer, studying these structures, notes that the ring of lymphoid tissue at and above the inlet of the pharynx and larynx was placed vertically and described it as a vertical ring of mucous membrane, infiltrated with lymphatic tissue and crypts. Since then this ring has been called Waldeyer's ring. Oppel quotes Bickel, saying that he considers the lymph tissue reaches its highest development in the tonsils. It is a good rule, when studying the tonsils, to consider them as part and parcel of Waldeyer's ring. (The circle of glandular tissue situated vertically at the entrance of the food and air tracts, comprising the pharyngeal tonsils or adenoids, the lingual and the faucial tonsils.)

The faucial tonsil lies in a recess called the sinus tonsillaris, formed externally by the superior constrictor muscle, anteriorly and posteriorly by the divisions of the lower lateral folds of the soft palate. The posterior portion is important, as it blends with the pharynx near the Eustachian tube and helps control the patency of the tube. It aids in opening the tube during the act of swallowing. Its injury, which is easily accomplished, results in imperfect tubal aeration, thus often leading to complete tubal closure with resultant rarification of air in the tympanic cavity, edema of the mucosa, chronic catarrh, and so on. It is to be remembered that the pillars being part of the soft palate, their injury with resultant scar formation may even interfere with proper swallowing function, causing an overactivity of the muscles concerned, thus resulting in chronic hyperemia and catarrh of the pharynx and larynx. Thus what is considered a simple operation may result in much harm. These statements are made in order to impress you with the importance of removing the tonsils with the least amount of injury to the surrounding musculature.

The tonsils are ovoid structures, made of glandular tissue with some important distinctions. First, the invagination of the surface epithelium forms the socalled crypts. These crypts have their apices terminating in or very near the capsule, and their dilated extremities open into the inner and upper noncapsular surface of the tonsil. Some crypts divide in to two or more tubules. Second, the tonsil is covered on one side with mucous membrane and on the other by a fibrous capsule. (A lymph gland is completely surrounded by a capsule.) Third, lymphatic vessels go through an ordinary lymph gland, but in the tonsils lymph vessels originate.

Dr. G. B. Wood asserts that the tonsil has afferent vessels only and that the crypts are lined with a specialized epithelium which may change into lymphocytes. He also calls attention to the fact that the tonsil drains mainly into one gland situated beneath the anterior border of the sternocleidomastoid, where the posterior belly of the digastric crosses it and calls it the tonsillar lymph gland. In the connective tissue around the crypts, leucocytes are always found *en masse*, as at the border of a country preparing for war. The rapidity with which the leucocytes multiply in this region has resulted in the follicles found here being designated as germinating follicles.

The epithelium in the crypts is constantly being shed or rather pushed off by the new growth beneath. This occurs in all surface coverings. This shedded epithelium, or socalled tissue débris, falls to the bottom of the crypt and if allowed to remain in the crypt soon undergoes some form of degeneration, probably fatty. These masses, it seems to me, are pushed out of the crypts by the migration of the leucocytes from the surrounding tissue and by the compression of the three muscles forming the tonsillar sinus during the act of deglutition. Physicians who see a plug of tissue débris coming out of the tonsillar crypt and diagnose tonsil disease on this sign alone are wrong in their diagnosis. One might call all ear canals diseased, if a driblet of wax is seen coming out.

In the upper part of the tonsil is a depression called the supratonsillar fossa (the remains of the pharyngeal portion of the second visceral cleft). This depression has several crypts opening into it, which openings are often partly closed by a fine fold of the anterior pillar called the operculum. This explains why most peritonsillar abscesses have their origin in this region. This was especially noticeable in recent epidemics of peritonsillar abscesses when the posterior pillar was more frequently involved than in the usual run of cases.

There are two maximum collections of lymph glands in the human body. One is around the throat (Waldeyer's ring), and the other at the ileocecal valve. These are possibly the most important portals, where infection may enter the economy. Are these glands so situated as to be an advance guard for the body's protection?

The blood supply of the tonsil is principally the tonsillar branch of the facial, which runs in the superior constrictor muscle and breaks with small branches just before piercing the tonsillar capsule. The other vessels run in the musculature of the anterior and posterior pillars, again calling attention to the fact that injury to the musculature around the tonsil increases the danger of the tonsil operation.

The tonsil appears in the human animal at about the fourth month of intrauterine life by an invagination of the epiblast into the hypoblast. It commences to grow rapidly at about the age of one year. The tonsil atrophies at a certain period, some authors putting it at puberty, others at about the ages of twenty-five to thirty years. My experience is that, if the tonsils are not diseased, they commence to diminish in size noticeably around puberty.

The question of whether the tonsils are normal, pathological, or simply vestigial organs is a mooted question, each theory having many advocates. When we take into consideration that the tonsils are found in all animals from the reptilian stage up to man, and that in man they are more complicated than in the lower animals, the vestigial theory must be ruled out. To assert that they are pathological organs entirely is simply another way of stating that Nature has erred in her manufactured product and has repeated this error throughout almost the entire animal kingdom. This is highly improbable and I need not defend Nature's methods any further.

Many investigators believe the tonsil has some function, even though it may be a limited one. They assert that the crypts are traps for bacteria or other enemies of the economy. To me it seems that the tonsils are normal organs, with a definite protective function in our economy. The tonsils are trying to readjust themselves to the new and changing conditions brought about by civilization processes. They are unable to cope with the new conditions, their resistance is soon overcome, and they quickly become useless and even harmful when left in the body. If we consider that Nature always has some definite reason for placing certain organs in certain places, we must go back to the lower animals and find an excuse for the tonsil being called into existence.

The tonsils are not found in fish but are noticed in some reptiles. Reptiles are fish which have raised themselves out of the water and become air breathing animals. This change from water to air breathing must have caused considerable additions and subtractions in the body, and one of the additions seems to have been the tonsillar tissue. Nature has apparently attempted to place an additional guard. In our precivilized animal existence this guard may not have intruded itself to any extent on our notice, as abnormalities among wild beings and animals are very rare. (The animal with an abnormality is often weaker than the normal and is soon gotten rid of.) Man, undergoing a process of civilization, living always under new, unnatural, congested conditions, has more quickly developed these organs, so attempting to protect him from invasions, only to find them too weak to cope with so many enemies. Almost from the beginning of our prenatal existence, the tonsil often becomes a liability instead of an asset.

Permit me to detail some of the theories at present in vogue as to tonsillar activity.

Dr. Wright has shown that dead matter like carmine is readily absorbed by the tonsil, but not so with bacteria. He also demonstrated that carmine remaining on the surface of the tonsil was more easily washed away than bacteria. Bacteria seem to have some cohesive quality toward living cells, but as long as these cells were in normal health they could not penetrate the tissues. Whether the epithelium evolves some substance which dissolves foreign matter is questionable. Wright believes that some general bodily disturbance, such as that caused by fatigue, exposure or gastrointestinal troubles, causes some sympathetic nervous derangement, which in turn produces alterations in the cryptic epithelium, this epithelium protecting the system against bacterial or other poisonous invasion.

Pluder asserts that the function of the tonsil is to produce white cells, but the amount produced is so small in comparison with the other blood producing organs as to make this organ of very little importance when the question of removal comes up for consideration. When asked why this blood producing organ was near the surface of the body while the other blood producing organs are deeply situated internally, he states that it is simply a coincidence and calls attention to the fact that the blood producing organs in many lower animals are found in the mouth.

Allen asserts that the function of the tonsil is to replace that of the thymus, which usually disappears at about the time the tonsil commences to grow. In other words, the tonsil alternates with the thymus. He also says that all over the body we shall find that blood producing organs do not work simultaneously, but alternately.

The preeminent topic among medical men today is the endocrines and according to some the tonsil produces an internal secretion. This theory seems hardly plausible, as no cases have been reported so far as I have been able to ascertain in which general disarrangement resulted from the removal of these organs.

Dr. G. B. Wood states that the production of lymphoid cells in the follicles of the tonsil causes a lymphoid current in it and that this lymph current is running through the lymph radicles toward the periphery, except when an accidental rupture of the cryptic epithelium exists. He also believes that toxins may be absorbed directly into the blood stream, producing general symptoms without enlargement of the glands of the neck. This is quite possible considering the rich blood supply of the tonsils.

Let us now consider some pathological phases of the tonsil. It has been proved that in about ninety per cent. of the patients dying from pulmonary tuberculosis involvement of the tonsils has been found. In four to five per cent. of tonsils removed from children tuberculous invasion of the tonsil was found. Cases of generalized septicemia following acute tonsillar infection are too numerous to need verification, but I will cite two cases.

Case I.—Several years ago I was called to treat a boy aged seven, who, in addition to a rheumatic infection of the joints following an attack of tonsillitis, soon manifested acute endocarditis. Rest in bed for several months, followed by removal of the tonsils, resulted in a complete cure of both heart and joint infection. The patient is well today.

Case II.—Another case of interest, although it worked the other way, was related to me by a physician. A young girl, aged eleven, never ill before, heart normal and healthy, was seized with an attack

of follicular tonsillitis, which cleared up in a few days. Three or four weeks later, the patient was brought to the doctor's office with the complaint that since the tonsillar attack distinct difficulty in breathing was noticed, interpreted by the mother as weakness. An examination revealed the source of trouble as an acute endocarditis. After a rigid rest in bed for ten weeks, the patient was able to go back to school and with extraordinary precautions as to exposure, managed to be well for about six months, when another attack of endocarditis appeared, sending her to bed another ten weeks. The third attack that followed in a few months was complicated with pneumonia, thus concluding the tragedy in the course of one year. I believe that if the tonsils had been removed, this patient would probably be alive today.

Let me quote some interesting statements gathered from the literature. H. R. Lille and H. R. Lyons report eighty-seven cases of myositis in which the removal of the tonsils caused an improvement in seventy-one. In one hundred and thirteen cases of arthritis, eighty-eight were improved by the removal of the tonsils. Eight years was the average length of time these patients had their ailments prior to operation. Of these two hundred patients, one hundred and fifty-four were unable to work; after operation eighty-two were able to work. Only thirty-three of the two hundred cases had any other treatment besides tonsillectomy. All these tonsils were examined on removal and found diseased. Other possible sources of infection should be examined.

J. M. Walsh, taking a leucocyte count in two hundred cases of chronic tonsillitis in children under ten years of age, found a leucocytosis in all. The count came down after tonsillectomy. Many cases of pyorrhea and tooth abscesses show improvement following the removal of tonsils.

How are we to judge when tonsils are diseased or not? Before attempting to answer this question, permit me to call your attention to the fact that an examination of the tonsils by simply inserting a tongue depressor into the mouth and looking at the tonsils is insufficient and almost useless. One should not only inspect the tonsils but should palpate them, that is, attempt to retract the anterior pillar to see if adhesions are present, and if so, previous attacks of tonsillitis or peritonsillar abscess must have occurred to cause these adhesions. Next turn the end of the tongue depressor against the anterior pillar and push back and out. This will cause the tonsil to rotate on its posterior pillar, exposing and opening some of the crypts, so expressing some of the secretion or pus that may be present. If pus is found the removal of the tonsils is indicated. Here let me repeat that I believe some exudate from the tonsillar crypts are normal, and unless pus is distinctly present, I would not advise operation on this sign alone. One must use wise judgment in these cases, paying careful attention to the history.

There is no doubt in my mind that there are too many tonsillectomies being done at present.

1. I would not advise the use of this squeezing method, even with a specialized instrument, in order to treat diseased tonsils, unless for any reason it is inadvisable to risk operative intervention, whether done under local or general anesthesia.

2. The tonsil should be removed when there is a history of frequent attacks of tonsillitis.

3. A history of even one attack of quinsy requires the removal of the tonsils.

4. Whenever the tonsils are so large as to obstruct breathing, or impair voice or speech, the socalled obstructive tonsil removal is indicated.

5. If one attack of tonsillitis is followed by some general disturbance, such as rheumatism, cardiac trouble, or arthritis, etc., early removal is advisable.

6. Embedded tonsils, especially those pushing the soft palate upward and so interfering with Eustachian drainage; the removal of the tonsils should seriously be considered.

7. In any generalized chronic ailment, when the tonsils look suspicious, with some enlargement of the glands of the neck, and other possible sources of infection, such as the teeth and sinuses, can be ruled out, remove the tonsils.

8. In ear conditions, such as chronic otorrhea, pains referred to the ear, even without any appreciable change in the drumhead, are often due to Eustachian blockage by the tonsils or adenoids, and their removal should be seriously considered. Some specialists advise a tonsilloadenoidectomy if the ear discharges longer than three weeks. (This time limit is questionable.)

9. Enlarged glands, especially when tuberculous, should have the most probable portal of infection removed; therefore do a tonsillectomy.

10. In some cases of keratosis tonsillaris, when the horny material is limited to the tonsils only, their removal is the quickest cure of the condition.

People are entitled to be freed from this avenue of infection, if it can be done without seriously endangering their lives. Therefore, when the tonsils have been established as the most probable source of infections, removal is the logical thing to be done.

In conclusion, permit me to describe what I consider a good tonsillectomy. First, the tonsils should show, on removal, a complete capsule on one side and on the other the cryptic mucosa. If any break is noticed, the probability is that some part of the organ has been left in the tonsillar recess. The results of the operation cannot be noticed immediately. They can best be seen several months later. It should be remembered, however, that even with the best technic and at the hands of the most expert operators, the ideal results often are not obtained.

To repeat, therefore, the first essential to success is to remove the tonsil and capsule completely. Second, the tonsillar recess should be clearly discernible. Third, the anterior and posterior pillars should be plainly seen and free from adhesions. Fourth, no scar tissue should be noted anywhere in the throat. Fifth, the uvula should be intact.

Most operators will admit having been frequently delighted with their operative technic soon after its performance, only to be chagrined several months later on finding the structures matted together or a piece of tonsil tissue left. A recurrence of tonsillar growth means that some part of the tonsil was not removed.

The operation of tonsillectomy unquestionably presents dangers, but it is worth taking the risk in view of the benefits derived therefrom.

Experimental Rickets in Rats*

By PROFESSOR V. KORENCHEVSKY.
London.

The results of my experiments and their technic have been described (1). Since then I have only increased the number of rats in several groups of my experiments and added only one new group, on the influence of parathyroidectomy on the skeleton of rats. This being the case, I will not trouble you with a detailed report. The number of rats, which have served me for various experiments, is indicated in Table I. I summarize results obtained by me in the following conclusions.

The results, obtained by me, agree in general with the results of the experiments of Mellanby on puppies and partly those of MacCollum and his coworkers on rats.

GENERAL REMARKS ON ANATOMY AND PATHOLOGY.

Solely, an anatomical pathological investigation of human rickets and osteomalacia cannot give the proper conception of the pathological anatomy of these diseases in their various forms. Experimentation alone can establish the origin of these forms from the same cause.

TABLE I.

Category of rats	Rats investigated histologically		Rats in which calcium and water were investigated in the bones
Control rats on diet N	35		23
Rats on diet N — SM	7		—
Rats on diet N — Ca (0.04 per cent. Ca)	21	28	17
Rats on diet — A	49		28
Rats on diet — A — SM	7		—
Rats on diet — A — Ca	31	38	20
Rats on diet N — P (0.22 per cent. P)	6		6
Rats on diet — A — P	8		8
Castrated rats	40		22
Rats deprived both of sexual glands and spleen	6		—
Parathyroidectomized rats	24		24
Rats that have received with food or subcutaneously a mixture of intestinal bacteria	5		4
Total	239		152

For the test following we shall denote the diets by the following letters:

N = Normal diet.
N-Ca = Normal diet deficient in calcium.
— A = Diet deficient in vitamine A only.
— A-Ca = Diet deficient both in vitamine A and calcium.
N-P = Diet deficient in phosphates.
— A-P = Diet deficient in phosphates and vitamine A.
SM = Saline mixture N 185 of McCollum.

A proper classification of these diseases can be made by considering only the etiological factor: because the same pathological pictures can result from different causes.

The experimental results, obtained by me, lead me to the belief that for the anatomical pathological diagnosis of rickets and osteomalacia there is only one essential, namely, retardation or absence of lime deposition in newly produced bone, giving a picture in which osteoid tissue is evidently increased in amount with sharp differentiation between it and calcified bone.

Therefore, although changes in the proliferating cartilage aid the diagnosis, yet they are not an essential factor: the increase and disorganization of proliferating cartilage depend directly upon the rate of growth of the bones; the deposit of calcium in the zone of provisional calcification depends on one hand upon the retardation or absence of the process of lime deposition and on the other hand upon the rate of growth of the proliferating cartilage and of the dissolution of the latter by bone marrow.

Changes in the periosteal and endosteal growth of bone, which goes on throughout life, can be observed independently of any changes in the endochondral growth of bone. This can be seen most strikingly in those cases of experimental rickets in which growth of the animal has ceased, while no changes are observed in the cartilage.

The formation of osteoid tissue around the trabeculæ of the subchondral spongiosa occurs in the same manner as that around cortical bone, namely, through the activity of osteoblasts. Therefore in rickets the production of osteoid tissue and its calcification occurs simultaneously in both regions.

INFLUENCE OF AGE.

In my experiments rickets was produced in rats provided the age was not greater than three to five weeks at the beginning of special feeding.

When feeding was started at the age of about two months a picture more characteristic of osteomalacia resulted; namely, no marked changes in the proliferating cartilage, very often accompanied by deposition of lime salts in the zone of provisional calcification. Therefore my experiments collaborate the view that there is no essential distinction between rickets and osteomalacia, the only modifying influence being age.

In rats at the age of three months or older, if a rickets producing diet is administered for about three months, changes are produced in the skeleton, but these are either not significant or show slight signs of osteomalacia.

CONFINEMENT.

Confinement in small cages does not evoke rickets in rats.

INFLUENCE OF SOME INTESTINAL BACTERIA.

The introduction of live cultures of Bacillus perfringens, Bacillus sporogenes, and Bacillus bifermentans with the food, and of Bacillus sporogenes and Bacillus bifermentans subcutaneously, produced no visible effect on the development of rickets in rats.

INFLUENCE OF A DIET DEFICIENT IN CALCIUM ONLY.

A diet deficient only in calcium produces a general disturbance in the body, especially in younger animals, namely calcium starvation, which is characterized by changes in the skeleton, retardation of

*From the Department of Experimental Pathology, Lister Institute. Report before the Royal Society of Medicine on December 6, 1921.

growth, very often accompanied by gastrointestinal troubles and an increased nervous excitability.

Changes in the skeleton can present resemblances to rickets, especially when the young rats have originated from a mother kept on the same diet during lactation. On an N-Ca diet the changes produced in the skeleton are due to insufficient calcium intake. In such bones the deposition of calcium is seen in the greatest part of the newly produced bone, but chemical investigation shows a very marked reduction; up to sixty-four per cent. below the normal calcium content. These two facts considered in conjunction with certain histological peculiarities manifested by such bones demonstrate that a reduced amount of calcium had been distributed diffusely throughout large masses of bone tissue.

The case with which calcium is deposited notwithstanding the reduced amount of calcium in the body leads one to doubt that calcium starvation alone can be the cause of human rickets as thinks Professor Aron and others.

Although there are differences between rickets and the condition produced by calcium starvation yet one can assert that calcium starvation can play some rôle in the etiology of human rickets or a special form of the disease. The manner in which the child develops the condition of calcium starvation is demonstrated principally by Aron and Schabad. This is as follows:

a. Normal human breast milk contains only the adequate amount of calcium, which the child requires during the first few months of life.

b. According to the investigations of Aron and Seemann the milk from mothers of rickety children seems to be poorer in calcium than that of the mothers of normal children, especially if the percentage is calculated with relation to organic content of the milk.

c. A normal amount of calcium in the milk may prove insufficient for the child if its growth is abnormally great on account of overfeeding.

d. Although the cow's milk contains a great amount of calcium yet according to the opinion of Voit, Fichl, Schabad and others, it is a form much less available for the child.

e. The digestive disturbances can also effect the power of absorption of calcium.

— A DIET.

Chemical analysis of the bones shows that in rats on — A diet the skeleton becomes poorer in calcium and richer in water.

In rats which continue to grow and do not starve upon a diet deficient in vitamine A, the picture of slight rickets or osteomalacia and less frequently of moderate rickets is produced. The rickety changes manifest themselves more in the production of an abnormal quantity of osteoid tissue than in pronounced alterations of proliferating cartilage.

Starvation, cachexia and cessation of growth are associated with a diet very markedly deficient in vitamine A and administered for a long period. These cause characteristic alterations in the anatomical pathological picture of rickets, previously produced by such a diet: the production of new bone is hindered and a portion of the body tissues, including bones, is burned in order to produce the necessary energy. As a result there cannot develop or there develops only to a slight degree the classical bony changes of rickets, namely, a marked increase in the amount of proliferating cartilage and osteoid tissue. On the one hand the increased resorption of bone, and, on the other hand, the lack of production of new bone combine to produce osteoporosis, the severity of which depends directly upon the degree of the above mentioned factors.

Typical rachitis florida I have produced in the young if the parents are fed upon vitamine A deficient diet during conception, pregnancy and lactation (experiments on eighteen rats) and to a lesser degree in the young of a mother fed on such a diet during lactation only (experiments on six rats) but even in such rats the rachitic changes may be modified by varying degrees of osteoporosis caused by varying degrees of starvation, cachexia and cessation of growth.

Therefore, experiments on the feeding of parents on food deficient in vitamine A or calcium during conception, pregnancy and lactation suggest that this may start disturbances of metabolism in the child which, if the deficient dietary be continued after birth, result in serious disorders of the skeleton. Therefore an inherited predisposition may be one of the contributing factors in the etiology of rickets. The statistical studies of Siegert, Ferguson and Findlay do not hinder such a conclusion.

Based upon the fact that gradual gradations between pronounced osteoporosis and rickets florida can be obtained in animals fed on vitamine A deficient diet, it is reasonable to conclude that rickets is present in all these cases. In osteoporosis it is present in latent form and would become manifest if starvation, cachexia and impairment of growth would be removed. Not only my experiments on rats, but also clinical observations on human beings are favorable to the view that rickets might be present in latent form in cachetic individuals that are not growing.

Vitamine A has an important relation to the metabolism of calcium in the organism and particularly in the bones, and therefore to the etiology of rickets.

— A-CA DIET.

The changes typical of rickets or osteomalacia occur most readily and most frequently in rats kept on a diet deficient both in vitamine A and calcium.

The changes brought about in the skeleton as a result of the cessation of growth, starvation and cachexia, in rats on — A diet occur also in rats on — A-Ca diet.

CASTRATION.

Castration performed before the commencement of feeding has no marked influence on the chemical and histological changes in the skeleton of rats fed on normal diet, on diets deficient in calcium or vitamine A, or deficient in both.

PARATHYROIDECTOMY.

In rats on N, N-Ca, — A, — A-Ca diets the removal of parathyroids does not seem to make a marked difference upon the changes in the skeleton, studied chemically and histologically.

In my experiments parathyroidectomy in rats on

a normal diet has produced similar but not as marked macroscopical changes in the teeth as those described by Erdheim. Each individual deficiency in the diet mentioned above produces the same macroscopical changes in the teeth.

CONCLUSIONS.

Up to the present time Morpurgo, Findlay, Mellanby, McCollum and his collaborators, and I, have produced experimentally, typical rickets or osteomalacia in different ways. Do these results solve the problem of human rickets? Certainly not. It is necessary first to prove that all of these play a rôle in the etiology of human rickets. The experimental results serve only to indicate some of the possible ways in which the problem might be solved.

My experiments have shown that the vitamine A deficiency alone is capable of causing rickets. They also indicate the importance of calcium deficiency, especially in combination with deficiency of vitamine A.

The question arises, this being so, why curative treatment of rickets by supplying codliver oil and lime salts is not invariably and rapidly effective.

I propose to suggest certain possibilities in this connection.

1. In 1920, Grosser published a report of his very careful and extensive experiments, studying the metabolism of rickety children daily for sixty-five days in each case. He found in certain cases of rickets only some of the organic calcium salts, and these only when given subcutaneously, could be permanently assimilated. This indicates the importance not only of the special form of lime salts but also of the method of administration.

2. By analogy I think it likely that the assimilation of vitamine A by rachitic children may be influenced by similar conditions. I suggest that subcutaneous injection of some specially favorable forms of vitamine A may bring out some new facts bearing upon the treatment of this disease. I earnestly draw the attention of clinicians to these possibilities.

3. Up to the present time there have been too few attempts to treat rickets by the administration of a combination of lime salts with vitamine A and perhaps oral administration is unsuitable on account of the production of calsium soaps. Hence I suggest the subcutaneous injections may give interesting results.

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Significant Signs in Acute Surgical Diseases in Children

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It was long believed that the American Indian was possessed of keener eyesight than the white man, and examples were given of his ability to discern objects out of the range of vision of his white companion. Careful tests of the vision of hundreds of Indians failed to show that their eyesight was any better than the well recognized average for the white race. It was shown, however, that he, like the sailor for example, was able to identify objects with which he was familiar at distances quite impossible to anyone not familiar with them. He had in his mind a definite image of the thing he was expecting to see and therefore recognized it earlier than his white competitor. This knowing what to expect gave him a reputation for great keenness of vision. In the same way, the diagnostician having in mind the significance of the symptoms which he observes, will arrive at a diagnosis more promptly than if he merely takes the separate symptoms and attempts to build from them a picture of the disease.

We are now suffering from the advantages of too many laboratory tests and no one is willing to deny any patient the advantages of any or all of them, when such advantage can be proved. But this paper is an appeal for a return to first principles in the recognition of disease, for a return to our clinical sense, and above all for discrimination in the value of the signs of disease. It can profit us nothing to know all about the patient except what is the matter with him. One repeatedly sees the utter futility of the delay of an hour for a blood count when the evidences of appendicitis could not have been either minimized or increased by the returns. Exactly as the laboratory often furnishes us with a complete diagnosis, as in typhoid fever for instance, careful history taking and special symptoms in many diseases in children furnish evidence equally positive and equally diagnostic. The early and correct diagnosis can only be achieved by giving to the signs and symptoms elicited their relative values, dismissing those which are of general rather than particular import and studying carefully those which are known to have a more direct bearing or are significant of the disease under consideration.

Emsheimer rightly says that "early diagnosis depends not on the number of symptoms presented by the patient, but on the recognition of their relative significance. One definite sign is of far greater value than many uncertain ones and is often all that is necessary to make a proper and final diagnosis. Familiar though this simple rule may be it is certain that it is not always observed, with the result that differential diagnosis is rendered difficult." Naturally it would simplify matters greatly if in every instance there were present pathognomonic or even significant signs of the disease, but this unfortunately is not the case, but that they are often present and are either overlooked or disregarded is undeniable.

The classical description of a child suffering from intussusception is about as follows: A baby about two years of age, or perhaps a little older, is seized with spasmodic fits of crying, cramps, evidenced by doubling up, turns pale, vomits, passes blood in its stool, is constipated, and presents a sausage shaped tumor in the abdomen, and later presents a mass in the rectum; but the waiting for the case to become classical has too often resulted in death. One often sees a child who at the time of the examination is not screaming, is not blanched, and is comfortably asleep. There is no palpable mass in the abdomen nor in the rectum. The mother states clearly that the child was perfectly well before this illness, and that it began to have severe cramps and turned pale, and either passed blood with the stool or by rectum without the presence of any fecal matter.

Now this combination, in a healthy child, of a sudden onset of cramps with the passage of blood by rectum, is significant of intussusception and should not be disregarded. In an analysis of fifty cases of intussusception, in children treated at Lebanon Hospital, this definite set of symptoms was always obtained and where the diagnosis was made upon this basis and early operation resorted to, the reduction in mortality was almost incredible. Operation upon children suffering from intussusception for less than twenty-four hours is now practically without mortality. The percentage of deaths in series where the intussusception has lasted thirty-six hours or more runs as high as eighty-four.

In descriptions of intussusception too much stress has been laid upon evidences of the disease which occur late or not at all, but when the intussuscepted bowel becomes edematous, due to obstruction of the circulation, it bleeds, and this blood showing in the bowel movement or on the examining finger, is directly significant of the condition. This, in connection with the characteristic history of the case, should lead to a correct dagnosis even in the absence of all other physical signs.

Appendicitis is by far the commonest acute inflammatory condition in the abdomen in children. Early operation is now accepted everywhere as the correct procedure in acute appendicitis. This acceptance is based primarily upon the low death rate in early operation and the inability of the most skilled clinician to state with any degree of certainty the pathological condition. Therefore, the early diagnosis of acute appendicitis becomes imperative. It seems like going back many years to restate that the tenderness in the right lower quadrant in children is a sign of appendicitis, and so for the purpose of intensifying the impression, let us say that tenderness to point pressure in the right iliac fossa in a child is the significant sign of appendictis. When one sees a child acutely ill, suffering from abdominal pain accompanied by tenderness on pressure in the right iliac fossa, the diagnosis of appendicitis is directly indicated. I am aware that the child may have something else, such as inflamed retroperitoneal lymph nodes, pneumococcus peritonitis, ovarian cyst, or other local pathological changes, but the failure to recognize the great weight that should be attached to this local tenderness fills our hospitals with children in all stages of periappendiceal abscess formation. It is of the first importance to adopt a method for abdominal palpation in order to elicit tenderness if it is present. If the appendix is suspected, palpation should begin with the lightest possible pressure with the finger tips over the left lower quadrant, then the left upper, then the right upper, and finally the suspected right lower quadrant. Henry Roth has called attention to the fact that if the child's hands are laid along the sides of its body and there is local tenderness, the child will raise the right hand as soon as the tender area is reached.

Many of the usual accompanying signs and symptoms of appendicitis or of peritonitis may be absent; for example, we may not have the usual local rigidity, the vomiting, the high temperature, or the increase in white cells, but tenderness to point pressure over a diseased appendix is a definite sign of the disease and cannot be explained away.

The most difficult differential diagnosis in this connection lies between appendicitis and pneumonia. When there is general rigidity of the abdomen and as yet few râles in the chest, it is seemingly impossible at times to arrive at a satisfactory diagnosis. In a recent case a child of six was seized with a chill and three hours later complained of a slight pain in the abdomen followed immediately by general rigidity over the entire abdomen. When seen several hours later, respiration was 50, pulse 150, and temperature 104°, and the case had all the outward appearance of pneumonia with no early signs of pneumonia in the chest. Here the abdomen was so rigid and the muscular defense so perfect that local tenderness could not be elicited. The appendix was gangrenous and there was no general involvement of the peritoneum. In these cases, where differential diagnosis between pneumonia and appendicitis is difficult, we have sometimes been able to show that between inspiration and expiration in the patient suffering from pneumonia, the examining fingers may make deep pressure over the region of the appendix without eliciting evidences of pain.

Because acute osteomyelitis occurs in the metaphyses of the long bones where the growing bone is spongy, the bloodvessels large, and the infection closely confined, the destruction of tissue and the absorption of the bacterial toxins are often prompt and overwhelming. This process of destruction, the immediate somatic disturbances, and the frequent fatal outcome are so well known that a description of the pathology of this condition would be out of place here. Knowing this, it places upon us the burden of fixing upon a definite or significant sign for what one may safely call the most commonly misdiagnosed disease in children. The clinical symptoms of acute osteomyelitis usually given, the sudden onset, chill, high temperature, swollen and painful joint, the redness about the joint, are all equally present in the occasionally seen single joint involvement in acute articular rheumatism. If one depends only upon the foregoing description of the disease it is readily seen that the diagnosis of rheumatism will still be made in cases of acute osteomyelitis. The x ray, too, is useless here and it has been shown repeatedly that waiting for x ray findings to reveal the lesion in the bone marrow is fatuous.

A positive diagnosis may often be early established if, in conjunction with the clinical picture described above, there is present definite tenderness to point pressure along the course of the bone, above or below the joint in question. This has been present in some of our cases as early as six hours after the onset of the first symptoms, and has persisted in cases where children were brought into the hospital delirious, in whom the only local signs were very slight swelling, but who screamed each time pressure was made over the course of the bone above or below the joint. The especial importance of this sign, which is, of course, not new, is that it occurs long before the redness, and often before the swelling. Movement of the joint is often not painful in the early stages of acute osteomyelitis, even in the presence of swelling in the joint, but the presence of this painful spot will confirm an early diagnosis. We have commonly found Staphylococcus aureus in the blood, but in the favorable cases in which there was early diagnosis and immediate operation this has persisted for a short time and the blood cultures have then been returned negative.

Morris Richardson said many years ago that any one with a carpenter's gimlet, a jack knife and the courage of his convictions could cure any case of acute osteomyelitis. There are enough cases of early and complete operation with a favorable outcome to make us almost agree with him, and it may be put down as a certainty that with the courage of one's conviction, a larger percentage of patients suffering from this malady could be saved.

The object of this paper is not to encourage the discarding of all the other well known signs and symptoms of the diseases under consideration, nor to condone the failure to take full advantage of a most carefully taken history of the case, but rather to suggest that the signs most directly indicative of the diseases mentioned be given their fullest value.

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Medicolegal Aspect of Morbid Impulses*

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The problem of the determination of the degree of culpability of a person who has committed an antisocial act is sometimes associated with great difficulties. A variety of factors may enter into the solution of this problem. An illegal act may be committed accidentally or unexpectedly and independently of the person's will. It may be committed under an unavoidable necessity, such as in cases of protection of oneself or one's family. It may be committed under the influence of extreme passion or anger, when consciousness becomes blurred and cerebral inhibition is obliterated. It may be committed by insane persons whose delusional ideas, accompanied or not by hallucinatory images, develop morbid impulses of deliberate and well planned criminal tendencies. Finally, illegal acts may be committed by those who, though not insane in the strict sense of the word, are nevertheless different from normal persons by their power of reasoning, by their sentiments, tastes, sympathies, etc. To this class belong the large category of psychopathic individuals, also the mental defectives.

We will be concerned here exclusively with the medicolegal aspect of morbid impulses in psychopathic persons and in mental defectives with the object of determining the degree of their responsibility or irresponsibility. In such cases there is a genuine medicolegal problem to be solved, while lunacy by the nature of the profound mental disorder excludes all possibility of discussion. Let us consider the cause of the existence and the development of impulses in the first category of our group.

The study of morbid impulses is very important because of the grave consequences to which they may lead from social and medicolegal viewpoints. Such a study presents multiple interesting features. First of all, the underlying basis upon which these morbid states develop. Since Morel the question of heredity began to play the most important rôle in the domain of mental pathology. It finds its corroboration also in the study of Mendelian laws of heredity (1). Morbid impulses constitute episodic manifestations in the life of psychopathic individuals.

What is psychopathy? Under this term is understood a pathological state of an individual whose psychophysical resistance is constitutionally diminished; in other words, it is a condition which is a deviation from the normal type of humanity. In such a person there is an interruption of harmonious equilibrium existing between various functions of cerebrospinal centres; the cooperation and adaption of these centres are incomplete. There is an ataxia of thought, of sentiment, of will, of psychomotor functions.

According to the parts involved, these patients form several groups which are only apparently different from each other, but under which is hidden the same individuality, viz., the psychopath.

The most important characteristic features in psychopathic persons are found in their psychical sphere. The development of their intellectual faculties is irregular and there is a want of equilibrium in these faculties. Such patients are only partial, incomplete beings. They may have a remarkable memory but they cannot fix their attention. Their mental instability is sometimes extreme. At the same time they may be eccentric, dreamers, with romantic tendencies. They are emotional, timid, extremely sensitive, impressionable, suspicious, egotistical, haughty and may be affected with moral perversity of the gravest

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nature. The best illustration of the loss of psychical equilibrium is found in obsessions and morbid impulses. The latter is the consequence of the first.

What is an obsession? Normally an idea, a sentence, an image may unexpectedly invade our mind and obstinately persist. It is sufficient, then, to exercise our will to a certain extent and make this phenomenon disappear. This, so to speak, physiological obsession, never leads to a morbid impulse. When a morbid obsession occurs, the cerebral centres are invaded by a certain image or idea, which remains fixed, and suppresses subsequently all antagonistic images or ideas. This is accomplished not without a struggle, but the tenacious idea is accompanied by a moral pain so intense that it subordinates the will, and the individual, perfectly conscious of what is going on, but powerless, finds himself irresistibly forced toward acts of which he himself disapproves. The obsession leads to an impulse, and these two phenomena are in the same relationship as a thought to the act.

On the basis of our conception of the unconscious world the phenomena under discussion finds an adequate explanation. The rôle of pathogenetic forces in the causation of psychoneurotic manifestations by the psychanalytic school is pretty well established. As the aim of this contribution is not the psychological aspect of the psychoneuroses but their sociological value, the analysis of the mental processes and of the conflict between the conscious and unconscious ideas which leads to the formation of obsessions and impulsive tendencies and other mental disorders characteristic of psychoneurosis, will be omitted.

The characteristic features of an obsession are therefore, A, lucidity as to the phenomenon; B, energetic struggle against the invaded thought, and C, moral torture. The elements of morbid impulses are: A, Sudden function of a centre or of a group of isolated centres without participation of reason or of the conscious ego; B, momentary impotence of the will controlling the act.

The state of consciousness, the apparent lucidity, are misleading for those who are not familiar with these disturbances and judiciary errors are readily explained.

In a psychopath who becomes fatigued, whose nervous system becomes exhausted, there may develop obsession and morbid impulses. Depressive emotion, prolonged intellectual effort, a prolonged waking state, excesses of any sort, abundant hemorrhages, protracted infectious diseases, disturbances of nutrition, intoxications, especially alcoholic, the sight of a capital punishment, the news of a suicide or homicide, the recital of a murder, are all provoking causes of morbid impulses in a psychopathic individual.

A young woman of thirty-five who was profoundly psychopathic, whose heredity was the most unfavorable (father syphilitic, mother alcoholic, a grandfather had paresis), had several miscarriages accompanied by tremendous losses of blood. Her recovery was of long duration. Soon there developed morbid impulses. Being a butcher's wife, she assisted him in carving meat in the shop. On several occasions while handling the large knife she felt a desire to cut off the customer's head. She realized her condition, she struggled with herself, resisting the torturing temptation. Finally once, in the presence of several customers, she began to scream; the knife fell out of her hands; trembling she begged them to remove the knife from her sight, as otherwise she would commit murder.

A young pharmacist, who has been under my care for the last two years, has frequently the almost irresistible desire to commit suicide. He is fully conscious of his condition, fights it often at the expense of his sleep. Once riding on a boat he felt the necessity of jumping overboard. Fearing for himself he begged the passengers to tie him to a post and keep him in this position until the boat landed.

Obsessions and irresistible impulses may affect also crimes of a less important order. In kleptomania there is an irresistible impulse to possess objects which are of no value. This is frequently done by those who are otherwise perfectly honorable, who possess sufficient means. Here, again, they are perfectly conscious of the criminality of the act, and of the consequences to which it may lead. They struggle against this tendency, they suffer morally, but they finally succumb to the irresistible impulse. Arson, assaults, rape, all varieties of sexual perversion, may be committed by a psychopathic individual under the influence of an obsession.

What is the outlook in obsessions with irresistible impulses? The evolution of these symptoms presents nothing typical. It may be periodical and intermittent. Sometimes it appears for a short period and disappears completely. In other cases it is slow, remains stationary for months and years. In still another series of cases the symptom disappears, but recurs from the least cause.

As Magnan has well said, "They are episode symptoms in the life of a degenerate. They are incorporated in the mental state of the individual, and never become separated from him. Appearing now and then during his life, they never undergo modifications; they are always the same."

In making a diagnosis in patients of this order it should always be borne in mind that while morbid impulses for minor offenses are frequent in the psychopathic individuals in general, the irresistible impulses for acts of graver nature, as homicide and suicide, are not frequent. They are met with often in true insanities in which the individual blows out his own brains or kills, seeks revenge, because he is under the influence of a delusion or is prompted by hallucinations of a terrifying nature. When a woman suffers from melancholia, she is mentally tortured by her delusion of the unpardonable sin, of her physical worthlessness, of deserving punishment for imaginary misdeeds. Voices are constantly reminding her of her wrong doings. Such a person will seek relief from continuous torture and finally commit suicide. Sometimes her delusive ideas will run in a somewhat different channel, and she will imagine that through her sins her relatives and neighbors, husband and children will undergo punishment and will suffer; in order to save them from inevitable suffering and torture she prefers killing them herself, and she acts accordingly.

In a paranoiac there develops in his diseased mind

a grudge against certain individuals, who for an apparently logical reason are persecuting him or trying to prevent him from obtaining a certain important position which they themselves are after. He hears their voices through the wall at night; sees them masked in his room. Another paranoiac gets a mission from God to preach, to convert the sinful men, women, communities, nations. He gets messages from the Almighty through spirits, angels, who order him to accomplish his task and destroy any obstacle on his road. Such individuals will exhibit irresistible impulses commanded by their delusions and hallucinations and commit homicide. In paresis similar delusions may lead to identical consequences.

In dementia præcox when the youth commences to show signs of dementia, hallucinations and delusions develop; excesses and assaults of the gravest character are committed, he kills or commits suicide.

A senile dement forms delusions of being defrauded, robbed, believes himself being persecuted. Frequently erotic delusions make him plan ridiculous marriages, and if he is prevented from doing it, he assaults and kills. Assaults of senile dements on very young girls or children are not uncommon.

In toxic insanities, especially alcoholic, the delirious and confusional states are frequently accompanied by delusions and hallucinations; morbid impulses are then easily formed.

In epilepsy, after the motor manifestations are over, the patient remains in a confusional, delirious, of stuporous state during which irresistible impulses may develop and a crime may be committed. Sometimes the epileptic attack itself may consist of a sudden irresistible impulse for attacking, assaulting, and injuring.

In determining the nature of and the motives for morbid impulses only a prolonged and thorough examination will help the medicolegal expert to form an impartial opinion. Let us briefly emphasize the distinctive diagnostic points as they are essential for a proper conception of these interesting phenomena.

When a lunatic assassinates, he is under the control of a delusional conception and hallucination or illusion, by which he is carried away towards the abnormal impulse. The latter has a special character, viz., unconsciousness of the act; automatism is the essential feature.

When a morbid impulse is the result of an obsession in a psychopathic individual, the characteristic features of the act are: The lucidity of consciousness, the tormenting mental struggle before the act is accomplished, the realization of the horror of the act. At the same time the state of anxiety of the patient is accompanied by cardiac palpitation, acceleration of the pulse, headache, tremor, perspiration, etc. All these symptoms occur in an individual whose mentality is abnormal, irregular, asymmetrical and without equilibrium. In such a person also the soma will frequently be found deviated from normal; there will be present many stigmata of physical degeneration, disturbed functions of the viscera, of tissues, of organs. A profound study of his own life, of his reactions to external and internal stimuli, of his adaptability to surroundings, also of his family history, of the hereditary features—such a study is indispensable in making a diagnosis.

PSYCHIC FACTORS OF MENTAL DEFECTIVES.

Let us now consider briefly the psychic forces in mental defectives which may lead to obsessions or morbid impulsive acts.

In considering all varieties of mental deficiency we find a long scale beginning with mental monstrosities and ending with slight mental feebleness. When the intellectual powers are involved in their entirety we deal with idiocy. When the arrest of mental development is only incomplete and is, therefore, compatible with the existence of some intellectual manifestations, we deal with imbecility. There are also those in whom only certain powers are likely to reach a degree of development; in whom there is no general, but only partial defect of intellectual powers. For example, one will show a meager power of intellectual acquisition, in another the power of judgment is defective; another is incapable of acquiring elementary mathematical knowledge, or a knowledge of the natural sciences; in another the power of attention remains very elementary; others show a marked poverty in the power of reasoning, of generalizing, of abstracting, of memorizing, of associating ideas. This category of individuals manifests a conspicuous inequality of development of various intellectual powers.

From the viewpoint of mental responsibility before the law, it would be superfluous to dwell at length on the idiots. The complete absence of intelligence, of moral conceptions of sensibility, places an insurmountable obstacle between idiots and the exterior world. Education has no hold on them, impressions leave no trace in them. Instinct alone guides their actions and their relation to others. Their life is reduced to an automatic execution of vegetative function.

In imbecility we find rudiments of intellectual and moral development. The intellectual niveau is somewhat higher than in idiots which, therefore, permits certain acquisitions. With considerable amount of patience, perseverance and ingenuity one may succeed in training imbeciles in certain moral principles. In spite of all efforts one can expect but a certain degree of mental development in an imbecile. His language remains poor as to the number of words; his articulation is defective; his expression indicates poverty of thought, the character of his acts corresponds to his manner of thinking. In the sphere of morality he exhibits instinctive tendencies of a low order. Cruelty, vanity, gluttony, masturbation, sexual perversion, excesses of all kind, cowardice, unusual irritability are all characteristic of imbeciles, and these characteristics lead frequently to all sorts of abnormal acts. Theft, arson, brutality, homicide —are not uncommon in imbeciles.

Following up the intellectual niveau one step higher than in the imbecile, we enter the domain of the large group of mental feebleness, the study of which is of considerably higher importance from sociological and legal viewpoints than of that of idiocy and imbecility. Here we meet with a great many varieties and subvarieties and the transition of one into the other is imperceptible. This is the most important chapter in the study of mental deficiency, as the number of such individuals is legion. We find them with us frequently, we deal with them in innu-

merable transactions, we find them on school benches, as well as in business life. Their relation to the community frequently results in harm.

This group presents, speaking generally, a mentality inferior to the normal in quantity and quality. Their intellectual development is both delayed and reduced. The slowness of mental evolution and its lesser amplitude are characteristic. Thus, for example, the intelligence of a boy of twelve resembles that of a child of five.

In view of the enormous influence of intelligence upon the shaping of the normal personality, the resulting moral debility is to be expected in the category of persons which is the subject of the present study. It is a common observation that apart from idiocy and imbecility, one of the chief characteristics of the feebleminded is an obtuseness of conscience. The elements of the latter are too feeble in the struggle against passions. It may happen that the mentally deficient has some conception of right or wrong, he may feel that he does wrong, but he does not possess the aversion which would be characteristic of a normal person. The moral censors are not powerful enough, the voice of duty is not loud enough to be overcome by impulse. The cause of this disorder lies in the incomplete development of moral ideas. The want of judgment, of will, the weakness of character render the moral personality of the feebleminded unstable, not resistant and thus they become an easy prey of their passions.

The majority of the symptoms referable to the deviations in the moral sphere gravitate around the ego of the mentally deficient. Thus the ego becomes extravagantly accentuated. Egotism consequently is one of the most conspicuous symptoms of the entire picture. The mentally deficient individuals have no other thoughts but of themselves. Nothing moves them, nothing disturbs them except their own disturbances which they immeasurably amplify. Such a psychic orientation naturally leads to a dominating attitude and intolerance. Envy or jealousy is another derivation of egotism.

Jealousy creates defiance and doubt; anger and hatred are the next consequence of jealousy. The mentally deficient may develop a hatred towards the dearest and the nearest. As egotism is the predominating characteristic, there is absence of altruistic sentiments.

Among other typical features of mentally deficient individuals may be mentioned impulsive phenomena. They are spontaneous and involuntary psychic manifestations. Normally our acts are controlled by two factors—desire or an impulse for action on one hand and reasoning on the other. The latter controls and inhibits the former. When the intellect is impaired or defective, the impulse predominates and the desired act is executed no matter how deleterious it may be; in such cases we observe frequently sudden impulsive acts in which neither reasoning nor will power intervene. In some cases the mentally deficient may yet at first attempt to reflect upon his premeditated act, he may yet appreciate the immorality and criminality of an illegal act, but the appreciation and meditation are not profound enough to overcome the instinctive tendency and the person succumbs to the latter. Morbid impulses may be manifest not only in criminal acts of a gross nature, but also in minor acts. The tendency to excesses is commonly observed in these cases.

On the preceding pages the essential features of mental deficiency have been briefly depicted. We have seen that the two important elements of the personality, namely, the intellectual and emotional, do no more preserve the parallelism of the normal individual. The intelligence being feeble it has no more inhibiting power over the moral personality. Struggle against passions does not exist or exists in a small degree. Impulsive acts are characteristic. The mentally deficient possess either an emotivity with exaltation in which great impulsiveness, sudden anger, extreme anger, violence and brutality are conspicuous, or else emotivity with depression in which they exhibit extreme timidity, extreme shyness or a tendency to solitude so that the resemblance to the attitude of a savage is in some cases striking. In some cases these two conditions may alternate. It is evident that the impulsive acts of the mentally deficient individuals are the expression of lack of control of ideas over passions. As the cerebral centres are the source of ideas and of their associations, we observe them here in a state of collapse; they appear to be withdrawn from the chain of genesis of ideas and of their manner of manifestations. Even the human principles of the French Revolution were unable to eradicate from the minds of the legislators the deep seated ideas of moral responsibility.

With the advent of Pinel and his school a new era entered the field. With him the old ideas suffered a decided blow. He succeeded in convincing human minds that insanity was a disease and that there was no crime if the criminal was insane while committing it. Gradually the field of responsibility became wider and wider. The criminologists of the new anthropological school, and with them the psychiatrist and all students of normal and abnormal psychology, jurists and enlightened laymen, all admit now that a psychopath, as defined above, presenting episodic paroxysms of pathological impulses cannot be considered fully responsible for his criminal tendencies and acts, and that instead of being committed to prison, he should be removed from society and placed safely to undergo medical treatment.

As to mental deficiency we have seen on the foregoing pages that besides a certain degree of intellectual inferiority, there is particularly an inherent deficiency of inhibitory power. We have seen the whole life of mental defectives is composed of incidents of an instinctive nature, as the instinct predominates in them, and, therefore, their actions are invariably the result of mental activities. The impulses are no more under control of the cerebral centres which ordinarily regulate our actions; but they exercise their influence on the motor sphere by producing an excessive activity. In such cases naturally there can be no choice of action, each movement is the immediate result of sentiment. The acts are unconscious, they must be executed because they are out of the field of struggle which normally exists between reasoning and passion. The acts are, therefore, mechanical, automatic, and of a reflex nature.

MEDICOLEGAL CONSIDERATIONS.

The question of responsibility of persons presenting morbid impulses is of the greatest moment from a social and medicolegal point of view. It is frequently accompanied by difficulties, and has led not infrequently to many judiciary errors.

Primitive society recognized crime as a punishable act, irrespective of any other consideration. The criminal was always punished, no matter what his mental state was. Ancient legislation ignores entirely the question of irresponsibility. The Romans were the first who distinguished between *compos* and *non compos mentis*. But the great difficulty was to determine under what condition an individual ceases to be *compos mentis*. Prejudices, errors of all sorts, religious and political passions, interfere with the proper understanding of cerebral functions, of impulses. These persons may be fully aware of the illegality of a certain act, they may fully realize that murder, assault, arson, deception, which they commit, are morally wrong and punishable by law and yet they cannot by reason of the very nature of their mental inferiority be held totally accountable for their actions.

The medicolegal literature is abundant with examples of indiscriminate conviction of this category of persons. Notwithstanding the considerable work of the psychiatrist; and the incessant labor of the profound students of psychology and of the evident and flagrant injustice to mankind, some jurists are loath to accept the humane and scientific principles laid down by the workers in this field of human knowledge. It is, of course, proper to advise, as they do, to moderate the passions and to learn to control them, but this is possible only for a brain free from any hereditary or acquired taint. It is just as difficult to control and direct the operation of a brain whose anatomical and functional integrity is affected as it is to hold oneself straight with a spinal column which is scoliosed or otherwise deviated.

The degenerates with morbid impulses are, therefore, irresponsible; but what is the degree of their responsibility between the acts, viz., during the lucid intervals? Here jurists, alienists, anthropologists are not exactly of the same opinion.

The old classical school of criminology believes in socalled partial responsibility. They say that because an abnormal brain, although not insane, has an abnormal will, an abnormal conception of right and wrong, the law should impose only partial punishment. The modern psychiatric views, the glory of which belongs mostly to the French school and especially to Magnan and his pupils, are based upon a different conception of degeneracy and criminology. Lombroso, Ferri, Garofalo, in Italy; Broca, Manouvrier, Lacassagne, in France, have laid the foundation for the modern anthropological school. According to the anthropologists the criminal is under two kinds of influences: intrinsic or individual and extrinsic or social. This double responsibility in a psychopathic individual is nil, and his responsibilty is absolute at all periods of his life; its excuse lies in the heredity and in the morbid impulses which are not present in normal beings.

When an expert is called upon to give his scientific opinion on crime committed under the influence of an irresistible impulse, he has to consider not only the crime, but also and mainly the criminal. As to the criminal, it must be determined whether he is insane or only a psychopathic or mentally defective individual affected with obsessions and morbid impulses. In both cases a thorough and careful examination is absolutely necessary.

When the crime is committed without a motive, while it is accompanied by a perfect integrity of conscience, and preceded by a mental struggle, there is no doubt that it was the result of a morbid obsession. In insanity the expert will sometimes encounter difficulties. In the first stages of a mental affection, in which a perverted mode of thinking, feeling, and acting is not easily recognizable; in epilepsy, when between the attacks the individual is comparatively lucid; in some cases of paranoia, when the patient will skilfully conceal the subject of his delusion—in such cases the expert will have to surround himself with all possible precautions, obtain detailed personal and family histories, interrogate the criminal at various times before he decides the question of insanity, viz., responsibility. The rôle of the expert in these conditions must consist not only of giving a personal impression more or less justified by his own experience, but also of presenting evidence which will be understood by laymen.

The determination of the degree of responsibility of a criminal should therefore be placed in the hands of an alienist. Only he is capable to determine early stages of insanity, only he is able to determine apart from insanity the degree of mental control, of inhibitory power of a delinquent who presents mental stigmata of degeneracy.

There is a frequent conflict between medical and legal conceptions of insanity. The law admits that a man with one fixed delusion may be sane on every subject except when he touches upon the delusive thought, and some jurists consequently argue that he can be considered sane before or after a crime is committed, but insane during the act. From a medical viewpoint such an argument is unscientific, for if delusive ideas are apt to originate in a brain, the function of its constituent elements is certainly disturbed. In such a brain one certain delusion may be formed and remain fixed, but by the very reason of this fact this brain must be considered diseased, and misconceptions with misinterpretations may become manifested at any moment. A person thus affected should by no means be considered "responsible before the law" before or after the crime.

When an individual's conscience is not completely developed, when judgment and will power are wanting; when egotism is pathological; when envy and hatred are intense and directed towards the dearest and nearest; when impulsive tendencies are conspicuous; when a thorough appreciation of acts and meditation are intrinsically not profound enough to overcome instinctive tendencies; when all these phenomena characterize mentally deficient persons, phenomena which constitute an integral part of their abnormal makeup—the problem of mental responsibility may be solved without special difficulty. It requires no special stretch of imagination to see that those mentally inferior such as depicted above possess inferior and defective conceptions of right and

wrong. The discrimination between the two is naturally faulty. They may recognze the illegality of an act, viz., that punishment by law may follow, but the fundamental and social value of a lawless act is not altogether accessible to their abnormal or defective intellectual and normal personality. It is therefore evident that their responsibility can by no means be total; it must be limited. The established legal test of right and wrong cannot be applied to these cases.

Those who create laws and those who administer justice view with very few exceptions only the social side of the law and usually are not at all interested in psychological and medical studies which present a different concept of criminality and of the criminal himself. It is true that penal legislation and legal medicine are distinct and separate sciences, but positive criminology must rely on both branches of human knowledge. An intimate unity of these two sciences is an indispensable and an essential condition of progress. Criminology has for its object the formation of positive laws concerning crimes and the discovery of remedies for them. With this object in view it searches the truth wherever it can be found and takes from medical and legal sciences data which it needs to form a scientific foundation. By the union of the two sciences the old and too narrow boundaries of human conceptions of liberty and responsibility will be broken and progress will be assured. Our present knowledge of normal and pathological processes in the psychic sphere, the proper appreciation of abnormal mental operations enable us to avoid errors in administering justice. In studying a crime we must distinguish the conditions in which it was committed and the psychic characteristics of the author of the crime.

I will conclude with the following propositions:

The legal conception of responsibility is not in accordance with the principles of science, and does not satisfy the practical exigencies of life. An alienist should be called upon to examine such a criminal. Administration of justice in such cases should be confided to a jurist and to an alienist.

Administration of houses of correction should be placed in the hands of alienists and pedagogues.

Youthful criminals should be placed, not in prisons, but in special institutions where they shall receive medical attention.

Conviction of criminals intellectually and morally defective is unjust and should be replaced by prophylactic measures which form a part of social hygiene.

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Modern Commentaries on Hippocrates*

The Humoral Theory and Its Relation to Others

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It has seemed expedient in the more recent papers, contributed by me to this journal, to follow ancient medicine in its relation to the humoral theory into the era of Galen. This led to a perception of the advantage to be derived in an exposé of the ancient humoral theory, from a study of the times and the personality of Galen. Both, I believe, had a profound influence in the shaping of the doctrines of future ages. But these things having been accomplished, not in the best manner perhaps, but in one as good as possible for the writer, it is with pleasure he returns to the Hippocratic Corpus again. Excellent as some of the essays, evidently from hands other than those of Hippocrates II, are, we are prone, doubtless too prone in our idealization of the Father of Medicine to adjudge to him those books, which in excellence stand out as preeminent. Now these books, which we fondly believe came from the mind of the Master, show a lack of reverence for the humoral theory or any other theory, which appeals almost as much to the heart as to the mind of the modern reader. It is chiefly in the books, commonly regarded as spurious, that we perceive a heralding of that era of crystallization and stagnation which received its last touches from the industrious and aggressive hand of Claudius Galen. With this general statement I shall not in this essay take great pains to remind the reader of the doubts of authenticity in referring to any specific treatise of the Corpus, but I shall leave that thorny and, as I think, insoluble sort of problem to abler palæographers and lexicographers.

In the last Commentary on Hippocrates (July 20, 1921) before my excursion into Galenic Medicine, his times and the manner of man Galen was, I tried to show the application of the humoral theory in the books of the Hippocratic Corpus to practice. It was indeed not difficult to select passages showing its association with other theories and its adaptation to correct as well as to erroneous clinical observations. It was difficult, however, to find its intimate association with the régime and the pharmacal treatment of disease and I fear I shall be no more successful in continuing the attempt now. The pragmatic philosophy which has been an outgrowth of the materialism of the nineteenth century and is as a matter of fact no philosophy at all, in the usual meaning given to the term, has this very valuable though not very original canon. A doctrine in its ultimate analysis must be subjected to the practical test of its adaptation to facts. Does it work? I fancy in this we find the reason it is so difficult for the modern reader to understand

*I have chiefly used the text and the French translation of the works of Hippocrates by Littré.

the actual application of the humoral theory in the works of Hippocrates, or Galen either. It does not work and it never did work, but it resulted in a distortion of facts and still worse in a most lamentable distortion of the medical mind for more than a thousand years. I may hope, however, to show its relation to various methods of thought, to ideas of etiology and semeiology, such as coction and crises, crasis and the pneuma. In the last instance, the subject matter of much of my previous discourse, its association has been frequently alluded to. It will perhaps be interesting to see in writers much more recent than Hippocrates or Galen these theories dominating more ancient thought, working side by side, in the study of the theory of medicine, if not so clearly perceptible in its practice. Here I am still engaged in an attempt to portray the working especially of the humoral theory chiefly in the books of Hippocrates.

At the dawn of medicine, as it has been revealed to us in written records, it was a firmly rooted idea that the odd and the even day, dating from the inception of the disease, bore an important relation to its subsequent manifestations. This seems as a matter of fact much older than the humoral theory itself, one of the shreds indeed out of which it was manufactured. It was doubtless one of the tenets of the Pythagoreans as to disease, but that specifically is no more apparent than their general influence in the building of the humoral theory itself to which they contributed the cognate ideas as to number. This seems to be the opinion both of Renouard and of Littré and all that archæology has told us since their time goes to confirm it. The juxtaposition of the numbers 1 and 2 in the whole number 12 had in itself a significance, if we are too accept the interpretation of the Golden Verses of Pythagoras by Olivet. The number 12 results from the multiplication of the next two in the series, 3 and 4. The Pythagorean supposed there were three worlds or three primary divisions in the universe, each made up of four parts. We see in this an affiliation with the four elements and the four qualities. The mystery of the Trinity in our Christian exegetics is no more a mystery than this and doubtless has with it historical affiliation. At any rate, the figure 12 and our division of time—our dozen sprang from the same mystification—became a mystic symbol for the divisions of the universe. "In this system the number four represents every substance endowed with its own attributes, distinct from other beings, whether God or man, plant or mineral; from this the Aesclepiads, heirs of the science and the tongue of Egypt," full of these symbols, attached the number to the qualities and the humors of disease. In the remark of Aristotle, incidental to his discussion in the *Politics* of the monarchical principle in the government of Egypt, we get a hint of the figure four, as we now have a chance abundantly to observe in the prescriptions of the Kahun and Ebers Papyri: "In Egypt," Aristotle says, "the physician was allowed to alter the mode of cure which the law prescribed for him, after the *fourth* day, but if he did it sooner it was at his peril." (III-xv.)

We need, however, further enlightenment on the question why the odd and even day so early assumed such an importance in medicine. As will subsequently appear in the course of this discussion, it seems extremely probable that this importance was at least accentuated by the phenomena exhibited by the tertian fevers. In the Pythagorean philosophy we see that hints may also be found of an origin entirely independent of the phenomena of disease. We may judge from a remark of Celsus that he also believed the *ancient* physicians were led astray by the Pythagorean reverence for numbers[1] but he finds no theory detailed in Hippocrates explanatory of his observations as to number. The author of the *IV Maladies*, however, gave an explanation which he thought, doubtless, reasonable enough. He supposes it takes about three days for the effect of the humor, good or bad, to become manifest after it has entered the body. We must remember that the humor was something extraneous as well as internal in its origin, but mingled with other things. Introduced with the food it was separated and went to the liver, spleen, the head, the heart, by virtue of their special power of attraction for that particular humor with which their activities were concerned. If too little or too much arrived the organ suffered derangement, except in the case of the heart. The heart having thick muscular walls did not suffer from such disturbances. A superabundance of either of the four is rectified by defecation, urination, expectoration, hemorrhage from nose or anus.

"Now I am going to tell how and by what influences the health is preserved. When one has eaten and drunk and the humor penetrates the body, mingling with the humor already there, in the manner I have said, having come from outside the body, it is established in the body the day it arrives. But tomorrow another humor comes (he has in mind the usual custom of one meal a day). This makes two days and two humors. One of the humors has two days' duration, the other one. The latter stays in the body being thick; the former being matured by the heat is diffusable and being light on the morrow reaches the belly, continually pursued by the fresh humor." The Greek word, used for the process we identify with digestion, which in Latin is translated as "coction," has a primary signification of "to soften, to ripen, to mature." It should be said that some of the ancients, among them Empedocles, visualized the digestive process as one of putrefaction, but the idea of coction prevailed, chiefly probably through the influence of or the necessity the humoral theory had for something which does not seem so final as putrefaction. This was an instinct in the right direction of course, but how curious when applied to the processes of disease as we understand them! We should instinctively prefer putrefaction as more significant of external bacterial origin. They clung to the idea of an upset of the equilibrium of an internal physiological process. If this is not wholly accurate in an interpretation of ancient thought, it is at least suggestive of a vast difference in their scientific environment in medicine and our own, and it brings out the alliance of the humoral theory with the ancient theories of digestion. It should

[1] Verum in his quidem antiquos tunc celebres admodum pythagorici numeri fefellerunt. *De Medicina*, III. 4.

be further remarked that in the Hippocratic books we get not only a trace of the lack of differentiation in thought between the different parts of the gastrointestinal canal, but the anatomy of the abdominal cavity in their discourse is also confused. Where the modern physician would say stomach, duodenum, colon, etc., the Greek is apt to say belly, the equivalent of the rô-ab of the Papyrus Ebers, when he really means in his now dawning differentiation definitely stomach. This leads the modern reader, with no such vague anatomical ideas, often quite astray. He is inclined to give a definiteness of translation to certain words, still undefined, which did not exist in any such exactly outlined conception in the mind of Hippocrates. "Stomach," then has its definiteness for us only when we are able to identify it by its modern conventional function.

"Arriving at the stomach it (the fresh humor) digests the food there and makes the blood of the body out of it. Its sojourn makes it foul. Upon the third day it departs with the excrement and the urine in quantity entirely equal (proportionate?) to itself, similar and corresponding and although this is only a part of it, the humor nevertheless remains in the body in accordance with the above account. Then the third day still, there runs into the belly from the body a portion of the humor, more abundant and more foul, that which had remained; it carries the digested food and that which is abnormal in the body (diseased?) and departs with the rest." I translate this from Littre's rendering of the text into French and comparing the latter with the text I see little to amend and cling as closely as I can to the literal rendering of the French into English, though despite all the allowances I have alluded to above it seems irrational, but evidently it satisfied the original author who remarks, after tracing out the physiology of the urine quite as obscurely: "Thus I have explained how and why men keep well." We cannot help believing the ancient mind like the modern mind was often complacent when facing a confusion its theories had made it too blunt to perceive. Molière mocked at such mental hebetude. Clouded by the persistent mists of theory it is the universal human mind, deeper down than any varnish of learning, which feels the benumbing effect of its prepossessions, no less than the limitations of its ignorance.

"At once after the expulsion of the faeces and urine a new supply of food and drink arrives in proportion to the dejections." Previously he had used a simile of three cauldrons or reservoirs—the fluid running out of one into the others through connecting pipes, when the fluids in the other two are drawn upon. Supposing, therefore, one meal a day the matter injected on the first day is expelled on the third. This, in ignorance of the fact that man, not God, divided time and invented numbers, seems to be the course of the thought which is busy with the problem of the cause of disease in its relation to the preservation of health rather than with the latter primarily and independently. A vicious method is combined with defective material in the formation of a structure for housing physiological and pathogenic processes together, a scheme which in itself has still to be rounded out before we approach any finality in the conception of disease or health either. Any transgression of this régime, as thus conceived for the humors, causes an engorgement or a collapse of the veins. It is not only a question of the condition and the amount of the entering humor, but of the time at which it enters. The first day and the third day stand then on a physiological basis and so it continues into the pathological process set up by too much or too little or the wrong kind of invading humor and so it is also that "on the odd days people recover and on the odd days they die." . . . "The humor departs on the third day or some subsequent odd day being driven out by some good humor following it or for lack of nourishment of the disease in having consumed all healthy parts the patient is also exhausted."

Even wounds follow along this track. The inflammation "declines the fifth day or rather, following the size of the wound, on the third, the fifth, the seventh, the ninth, the eleventh," an idea entirely devoid of any support in observation at all. Now here enters one of the hints we get that the precession of the chill in malarial fever uninfluenced by quinine, especially in its more common types, caused a modification in the gentle flowing course of this sort of exposition. Why not the thirteenth? Even surgical fever had to be modified in its description to conform with general principles, I suppose, here as well as at other seven-day periods. "A first period having elapsed the third day (from it), which is the fourteenth, counting from the first before the beginning of a second period, it is on the fourteenth day that the inflammation of large wounds declines." Something had to be done in malarial fever reckoning finally to get the odd and even into working order or the chills would sometimes be found changing over to an even day, and as surgical fever and other continued fevers kept up every day, rain or shine, the chills, if there were any, had to be ignored and the imagination tortured into a compliance with the ever present example of the common type of malaria. Perhaps I am letting my own imagination run away with me, but that is the way I struggle to get out of a mire of ancient chaos, as it seems to the modern mind, in which the ancient mind must have had struggles of its own. The disorder introduced into every day life by the precession of the equinoxes had to be rectified by Caesar, then by Gregory, and we are still compelled to be wary of it. The cosmic refusal to submit to man's arrangements had its counterpart in the refusal of disease phenomena to fall into the lines arranged for them by the humoral theory. Time is man's invention, not God's.

"There are three principles whence maladies arise: I have explained one of them (plethora)—for want of evacuation a man falls sick. The second is the changes of the weather. The third is external violence, including also fatigue and other things of this kind." The general sense of this, falling under three etiological headings is:

1. Plethora—from errors of diet and regimen. 2. Weather, primarily or secondarily to these and other causes. 3. Violence, fatigue, and other things.

This last is the most interesting to us because under it we are able, as much as anything from its vague comprehensiveness, to include many of the factors in the processes of infection in its broadest sense. The exciting and the predisposing causes we see undifferentiated, but with it all we are able to perceive a fairly extended grasp of the real causes of disease, in spite of the falsest of theories.

The demand, therefore, is a quite natural one when it is asked: Where does the humoral theory come in? It is not easy to get at the bottom of this conception, because the author himself, and in many other treatises other authors, are busy repeating or accepting the view that the humors are the causes of health and disease. A little reflection convinces one that this is an instance where the use of language falters in exposing the meaning because there is no meaning. I think we can best furnish an entrance to it here by the abolition of the common conception of cause altogether. At bottom it has no business in scientific language anyhow, in medicine or any other field where careful thinking is necessary. There is a finality hangs about the word with which science has nothing to do. Disease and its causes must be visualized as a process, whose termination is death or health but whose beginning we cannot hope to reach. We must break in on the process somewhere arbitrarily. Since we have ended it somewhat arbitrarily at health or death, there being processes that go on too both before the one and after the other, we might choose birth as the beginning, but we are keenly alive to the fact that the processes of disease now in our ken long antedate the birth of the patient. However, we have pursued this train of thought far enough to allow us to realize that the category of causes given above is only a cross section, or sections at different levels, of a process which is too tangled and complex to make the comparison to a chain with links entirely satisfactory, but it does give us a glimmer of reason.

In the author's reflections on the causes of leucorrhea we find it ascribed to the phlegmatic temperament of the woman and to the bile in movement without having been evacuated, but despite this, as Hippocrates said in the *Ancient Medicine* would be the case, we find him giving not something to warm the cold phelgmatic temperament or a chologogue to purge her, but the recommendation of poppy seed, classified, later at least, as cold in nature and in physiological action. Now let us see how he knew the menstruating woman was cold and phlegmatic and so perhaps we can understand why treatment continued guided by experience rather than by theory for the most part. "If you wish to purge a woman who cannot have a child, look if she be bilious or phlegmatic. You will recognize which of the two tendencies prevail by this; throw some sand out into the sun, pour on it the menstrual blood and let it dry; if she is bilious, the blood will be yellow on the sand; if she be phlegmatic, it will exhibit a sort of a mucosity. This being ascertained, you can evacuate by the bowels the humor which predominates," that is, use purgatives known to bring out either the bile or the mucus, as the case demands. The yellowness of sputum when it occurred was the indication of bile being in superabundance. These being the bases upon which therapy consonant with theory had to be built, it is not surprising if the results were sometimes at variance with expectations and the most enthusiastic humoralist forgot his principles when he came to practice, but had other troubles.

In the *Nature of Woman*, by the same author as the *IV Maladies* from which I have so extensively quoted, whether the cervix uteri is soft and moist or hard, you must apply a counter irritant, which hardens by its mordant and inflammatory action in the first condition and in the scirrhous cases it brings out the humor and then you can apply emollients. If a woman is phlegmatic rub up a little daphnia tartonraira, if bilious let her have daphnia laureola, though what makes one an antiphlegmatic and the other a chologogue may still be patent in modern pharmacy, but it lies outside of current knowledge today. We may remark, by the way, the descriptions by this author of uterine measures carry us back to the Kahun Papyrus and the land of Egypt. The method of telling if a woman is fruitful or not, a thing of much concern in the Orient and of much prurient curiosity in Europe of the Middle Ages, the exposure of pharmaceutical preparations to the dew of the night, the frequency of the use of the poppy, the stercotherapy, all point to gynecology on the banks of the Nile, but we find in this ancient derivation no explicit suggestion of the humoral theory, one reason perhaps why von Oefele derives its Greek development from Asia, but the evidence seems to me to point to its development, as we know it in Hippocratic medicine, in the historical period in Greece itself. The critical days and the chronology of disease we have traced as well as we could, though somewhat conjecturally, through the Pythagoreans to Egypt and the East, but it seems clear that some localized phenomena are responsible for the way the theory bloomed afterwards in the medicine of the Mediterranean shores.

It is possibly significant of an origin earlier than that of the efflorescence of the humoral theory itself that we have to turn to the genuine and for the most part to the older books of the Hippocratic Corpus for a more complete and a clearer exposition of the ideas in regard to the critical days and the periods through which the fevers and other affections passed. What a half tertian fever is I do not know, but in the *1st Epidemics* we are introduced to some sort of an intermittent fever as distinguished from our conception of the quotidian, the hectic and the typhoid, and we are at once put on the track of the periodicity of malarial fevers as responsible for much of the classification of odd and even, though, especially as to this, the intrusion of lobar pneumonia with its striking recovery by crisis, and typhoid less obviously, but observable, as terminating by lysis, were phenomena so frequently forced on the attention that they too must have lain at the back of medical thought in the basin of the Mediterranean when the humoral theory was building. Immediately in sequence to the mention of the semitertian, which we associate by the name alone with malarial fever and may not have been malaria at all, we find the discourse drifting off into something fairly well descriptive of pneumonia—"such was the course of these phthisislike cases."

Modern critics have at times asserted that Hip-

pocrates had to do in his day with types of disease unknown to us. We shall see that very likely something of this is true, but it is well to keep these opening paragraphs of *1st Epidemics* especially in mind as throwing a flood of light upon a congeries of cases, for us in entirely remote categories, standing as we do on an etiological basis, but existing in the mind of Hippocrates grouped on a basis of symptomatology. So far as there was any grouping it is misleading for modern readers. Why should not the ancient observer be struck by the similarity in the sudden defervescence in some cases of pneumonia with the abrupt termination of a malarial paroxysm within a few hours? That the latter was likely to recur and the former likely to proceed steadily, but more slowly, to recovery did not throw them entirely apart, did not entirely destroy the illusion of their kinship. This I instance as much to serve as an example of something else—as a reminder that the bacillus pneumoniæ, if it is a bacillus, and the plasmodium malariæ, do have a similarity in their pathogenic manifestations which does not occur to us, intent on other interests. It is an example of the strange picture of disease given by Hippocrates when he summarizes, while objectively his narration of individual cases is far less confusing to us because we can then do our own grouping.

Entirely at random I open the third volume of Littré's *Hippocrates* at the page recording the case of the seventh patient in the *IIIrd Epidemics*, second section of the first constitution, as Littré arranges things, the woman who dwelt with Ariston. She had an angina, a hard swelling about the neck, fluid returned from the nose when swallowing was attempted. Now this may have been a Ludwig's angina or it may have been diphtheria—that is, Ludwig's angina may then have been of more frequent occurrence, or malignant diphtheria accompanied by extralaryngeal swelling may often have been seen. We now rarely or never see Ludwig's angina in a woman. All these variations in disease types from our own may have been real or they may have been verbal only. How much swelling? We do not know. It was some profound toxemia with a throat lesion. The fifth day she died. The young man who dwelt in the Place of the Liars, the eighth patient, died on the seventh day, but with no throat trouble at all. Typhoid in the history can hardly be mistaken, though the fatality of it, "dying on the seventh day"—"an acute case," is striking. We know why in some of the fevers in our category of typhoid the patients die as early as the seventh day, others go on to the fortieth, even some to the eightieth day. Some naturally too, most of them in fact, do not strictly get well precisely on the twentieth, the fortieth or the eightieth day, but if we had our gaze glued constantly to the marvel of numbers, the marvels of mathematical science, the mysteries that Pythagoras brought from the East, as assiduously as we have them glued on the marvels of the microscope, the mystery of radium, the fascination of the clouds that float in the test tube, I am quite sure that our minds would have fallen as theirs did, prostrate before their fetiches, the astounding revelations of the multiplication tables and the queer coincidences of angles, the singular adaptation of cubes and spheres to spaces calculated from them.

We are still busy with space and time, not altogether satisfactorily to the ordinary human mind after three or four thousand years of training, but how in its infancy the mind must have marvelled, how deeply it must have been impressed, how absorbed in the possibility of arranging all things into multiples—units of time and space—and we suspect such units are mere artificialities, artefacts to help the engineering of life. They were realities, not mere figments, for Hippocrates, badly understood and their marvels greater than even microorganisms were for us a generation ago. As we read, however, all does not fit into the typhoid category or the malarial categories. The remittent and the typhoid and the malarial and the typhomalarial fevers were a sad mess for our grandfathers who knew nought of bacteria, but even their puzzles bore a different aspect for Hippocratic practitioners who knew nought of quinine. We know nothing of malarial fever whose course is undisturbed by quinine and many of the puzzles in the *Epidemics*, not all of them of course, would be easier for us if we were familiar with the works of the plasmodium unassaulted by the alkaloids of cinchona. In the first *Epidemics* we do see that the "phthisoids" with cough and sputum for the most part died and the other fevers were less severe, but the chronology was what absorbed Hippocrates. These crises, the odd and the even, we see rested on a basis of facts—the discontinuity of malaria—always in existence and on a basis of a cosmical theory of numbers beginning before history and bringing us in our day only to the realization that the gods in their day were joking with the Greeks when they opened out to them prospects of becoming acquainted with Time and his twin, Space.

"In the autumn and during the winter, continued fevers, day time fevers, night fevers, semitertians, genuine tertians, quartans, indefinite fevers, each one affecting many people, prevailed," the tertian the most of all, mild malaria late in the autumn and in the winter. It is not entirely incomprehensible, this confusion of words of which Lucretius complained and of ideas which are so foreign to us, and here and there in the chaos we find concrete things shining forth to us quite plainly. The delirium and the coma and the burning high temperature, the phrenitis, the lethargus, the causus, have for us a well understood pathological basis. The night fevers, the indefinite fevers, we group with the hectic, the septic, the chronic malarial and we know they are apt "to last a very long time" and to have many relapses, many ups and downs, in the absence of proper treatment especially. We know what the hemorrhages, whether from the nose or the bowel, mean and we know what the paralyses following sore throat mean, but their frequency and the hemiplegic character of many of the cases, in the "third constitution" leave us in a helpless state. Whoever heard of an epidemic of apoplexy? Some new disease may after all have lurked in the epidemic at Thasos, but taken together in the mass, except for prosaic unimaginative minds, the picture drawn by Hippocrates in these *I and III Epidemics* is a vivid and striking and realistic one. In the infancy of differentiation, more than two thousand years before Rokitansky and Virchow and Pasteur, it is indeed a panorama sketched for us by a master hand.

Editorial Articles

PRESENT STATE OF RADIOTHERAPY OF CANCER.

The indications for radiotherapy in cancer, whether to effect a cure or amelioration, or to be combined with surgical treatment, is a subject of importance at the present time. Great progress has been made in the use of penetrating rays which may be regarded as true elective poisons of the chromatin of the cell nucleus. The rays act more especially upon the cells undergoing reproduction, a fact which explains their power over neoplastic cells which are endowed with an intenser reproduction than the cells of the normal adjacent structures. Each neoplasm has its special radiosensibility.

Radium therapy is also a newly acquired means of treatment of malignant disease, by direct introduction of radium into the tumor mass. There is a procedure which gives excellent results but requires special technical knowledge on the part of the operator, namely, radium puncture, the transfixion in various parts of the neoplasm with needles containing radium or emanations of radium. Before any treatment is undertaken, it is absolutely essential to make a biopsy of the growth on account of the variable radiosensibility of the various types of neoplasms. In the great majority of cases treatment will bring about an amelioration, such as cicatrization of the ulcer, retrogression of the tumor, attenuation or cessation of the pain, and occasionally a veritable cure, and sometimes also an aggravation of the process.

There are in fact contraindications to radiotherapy in cancer. There are the cancers refractory to the rays—branchiomata and melanotis sarcomata, likewise the socalled acute cancerous processes. The treatment is dangerous when deep local infections, especially pelvic, exist, and then one should also be fearful of perforation of a hollow viscus, the seat of malignant growth, the risk of bone necrosis following the use of the rays, cachexia and visceral metastases.

If the neoplasm is operable it is impossible, in the present state of our knowledge, to tell whether it should be dealt with by radiotherapy or surgically treated. In some cases, however, the indications for the use of the rays is clear, such as basocell epitheliomata of the skin and mucosa, while sarcomata and lymphosarcomata possess radiosensibility in a very high degree. In other cases, on the contrary, radiotherapy is clearly contraindicated. These cases are spindle cell growths, which are very resistant to rays and malignant growths seated in the portion of the digestive tract comprised between the esophagus and rectum. There are two conditions in which opinion does not agree, namely, the use of the rays in carcinoma of the cervix uteri and alveolar cancer of the breast. In both, preoperative radiotherapy offers great advantages, as it does in any case of operable cancer, because it is easier to apply the treatment to tissues as yet not operated on and it prevents dissemination of the malignant cells when operation is done. When resorted to after operation radiotherapy is less active and it has also the disadvantage of hindering the process of cicatrization.

In inoperable tumors, excision after radiotherapy treatment is to be advised, as by so doing absorption of toxic products is prevented and the autoimmunization of the neoplasm against the action of the rays. In spite of certain advantages radiotherapy is merely a local therapeusis; it does not deal with the soil or the causal agent and it is perhaps too much to anticipate that in the future chemiotherapy may possibly take its place.

FATIGUE AND INFECTION

Some experiments carried out recently would seem to indicate that fatigue does not render an animal more susceptible to infection. The experiments were done on rats in a motor driven treadway. We are so accustomed to having time honored theories knocked about that we are not shocked at, though we remain highly sceptical to, the results of these experiments so far as their human application is concerned. What is fatigue for rats may not be fatigue for humans, and there enters into the problem the surroundings and behavior of the human being when he is supposedly fatigued.

Fatigue, in man at least, has never been clearly defined and we feel far from explaining its origin. There enter in so many different factors. It has been attributed to wear and tear in muscle and the accumulation of waste products in this organ. The condition of the nerve end plate seems concerned in the matter and a using up of the material of motor nerve cells has been found by good investigators. The accumulation of waste products in the blood is believed to take place, and a fatigue toxin was presumably discovered by one physiologist. But over all, in the human subject, there is the element of mental attitude. A class of girls in gymnastics will show the most evident signs of fatigue after a gymnastic lesson, and the teacher may

fancy he has overdone the matter and imposed too much of a task, but immediately afterward, should a popular dance tune be struck up by the pianist, the whole class will be dancing as if they had had no previous muscular exercise. The pupils were suffering only from ennui.

Even the tests for fatigue of a few muscles, which were devised by the experimental psychologists, have, of late years, been considered very unreliable, the mental attitude element upsetting all conclusions. With so simple a test we do not know when the fatigue is physical or mental. If it has been difficult to define fatigue, it has been as difficult to distinguish fatigue from exhaustion. It is interesting to note that in experiments on dogs the personal equation comes in very markedly. Many dogs cannot be persuaded to run in a treadmill, while others will run till they drop.

After exercise the human being is more likely to put himself in a situation to become chilled or may conduct himself in other ways which will render him susceptible to infection for which the fatigue is not directly responsible. In this connection it should be mentioned that Vernon, in a study of the effect of fatiguing work in tin mills and other factories in England, could discover no definite relationship between fatigue and the incidence of sickness, what excess illness there was seeming to be due to carelessness about exposure to chilling when wet with perspiration. The subject deserves further study on other animals, and if a definition of fatigue can also be worked out by the investigators it will be of much value.

DEVELOPMENT OF THE NEURON IN THE ORGANISMIC PATTERN

Child makes a very interesting study of the development of the nervous system as a response, through the protoplasmic properties of excitation and transmission, to the stimuli of the environment. (*The Origin and Development of the Nervous System*. Reviewed in this issue.) When he comes to the discussion of the origin of the neuron pattern, considered in its separate phases, he makes some criticism of Kappers's theory of neurobiotaxis. He believes that this theory has to assume certain conditions not always present, as for example, the presence of functional neurons, although axons and dendrites first undergo differentiation in the nervous system, or as the presence of a fluid medium, when in truth the neuroblast is at first lodged in a very compact tissue. He briefly reviews Kappers's hypothesis as that of a shifting or migration of the neuron and the growth of the dendrite toward the locality from which the majority of the stimuli come. This process is explained as a galvanotaxis in an electrical field, the course of the axon being directed toward the anode, that of the dendrite toward the cathode.

Child seeks to avoid the difficulties he has pointed out and at the same time to enter more minutely into the possible reactions which explain the phenomena of growth in the nervous system. He adds to the theory of electrical attraction that of change also in physiological condition, which in turn rests upon differences which arise in polarization of the cell. A current passing through a living cell will cause migration of ions in opposite directions where, owing to the incomplete permeability of the cell membrane, they tend to accumulate at the opposite poles of the cell, negative ions at the side toward the anode, positive ones on that toward the cathode. This polarization alters the physiological condition and activity of the cell. There is much evidence for the fact that when internal electropositivity of the cell is increased directly by electrical means usually there is a condition of excitation or an increase of functional activity. Therefore the rate of cell metabolism, as of its physiological condition generally, is increased, with a corresponding decrease of activity in the region where increased negativity has taken place. The condition as regards the living cell, however, is that which must be remembered of the galvanic cell. The directions of the current within and without the cell are opposite as regards the polarization. If the cell is not in direct tissue connection with the medium in which it lies its polarization is opposite to that of the medium.

In the compact tissue of the neural tube the cell is in the condition of coherence with its surrounding tissue and the axon appears as at "the high end of a physiological gradient, electrically determined in each cell, by the electric currents of its environment." The cell body also appears to migrate in the direction of the greater physiological activity. The rate of growth of the axon tip may decrease as it grows further from the region of high positivity, other factors also entering, perhaps, to determine the relation of the axon to its peripheral organ. It is possible that the positivity of the peripheral organ may bring about the second type of polarization in the axonal tip, that of the reversal of the polarization, and so direct the growth of the axon toward itself. An axon appears to grow against a general body gradient when in reality it is following the local gradient which initiated its growth. In this the positivity is sufficiently strong to counteract the positivity of the general body gradient.

Such local gradients are probably frequent in the development of the central nervous system.

Child admits that there are probably more factors entering into dendrite development. Yet the problem may be briefly stated by saying that they represent a lower degree of dominance during growth. They doubtless express the same physiological effect of polarization but represent the opposite half of the current of the electrical circuit. That is, they grow toward the electronegative surface of the axon tract. The relation of the axons of certain neurons and of dendrites of others may be due to the "developmental or functional activity of the one and its effect on the direction of growth of the other. Different dendrites of a particular neuron may enter different electrical fields and so establish connections with different neurons, and it is conceivable that some dendrites may remain nutritive organs."

PREVENTIVE MEDICINE

No phase of medical service is now occupying so pertinent and important a position as that of preventive medicine. Doubtless one of the principal reasons for this present emphasis of the subject is the astonishing and distressing fact revealed by the draft examinations that more than fifty per cent. of our young men were found to be below par, in most cases from causes that might have been prevented. Director Louis I. Harris, of the Bureau of Preventable Diseases of New York, has in the *Monthly Bulletin of the Department of Health* for December, 1921, an article which is a contribution of unusual interest and value to the literature of this subject. One may not always agree with Dr. Harris in some of his criticisms, yet the trend of his suggested program for remedying some of the evils of present day conditions and for building up new lines of productive activity for medical practice are to be commended to the careful attention of the profession.

Dr. Harris writes: "The force of a powerful, and, if you so choose to term it, a subtle influence in favor of the reorganization of our system of medical practice is making itself heard and felt. Even though the advocates of such changes may have insufficient statistical data in justification of their demands, we cannot ignore them. We must take into account the increasing emphasis and extension of an old conception of the duty and obligation of the community, that is rapidly gaining converts, which is, namely, to guard in every way possible the welfare of the citizens comprising it. The proponents of this new social program stress the obligation of the community to tender adequate medical service to all persons who cannot secure such care out of their own resources, and reject every system or institution which offers doles, gratuities, or alms, no matter whether these come from private philanthropic individuals or groups or even from physicians. This view, whether we regard it as antagonistic to individual initiative and legitimate private enterprise, is held by an increasing number of social and legislative leaders. We cannot ignore it except at our peril."

The points emphasized by Harris are, in brief, as follows: The public must be made to realize the great contrast between the physician's assertions, based on long, difficult study and training, research and laboratory work, and wide experience, and the often shameless pretensions of the practitioners of the many medical cults and irregular forms of healing. Because of the recent multiplication of medical specialities, the general practitioner must now allow himself to become obsessed with an inferiority complex, but must aggressively assert his capacity for growth and adaptation in the service of his patients. He must not, if the case becomes trying and difficult, tire of it and abandon it to run the gamut of specialists or of the charlatans, most of whom have learned the value of a friendly and hospitable attitude toward their patients.

"It is greatly to be desired," says Dr. Harris, "that reorganization from within the profession should affect a close correlation between the general practitioner and the specialists, in order that the limits of independent practice of specialists would be defined, so that the unequal and losing battle which the general practitioner has been waging to hold his own against the increasing competition of the specialist may be ended and that the medical profession through its organized agencies, the county societies, should make the best skill available to all groups in the community needing special types of medical service." Hospitals, which are in the main under the control of private groups of philanthropic lay persons, should be opened to all practising physicians. The county medical societies ought to lead in this fight in behalf of the public weal. Although the pay clinic makes inroads upon the work of the specialist in particular, in establishing a flat fee, frequently excessively low, it sets a standard, which, if accepted by the public, must play havoc with the private practice of physicians; it employs physicians under contract service; it denies representation on its governing boards to the rank and file of its staff; and it may, without violation of medical ethics, make capital of its connection with prominent physicians.

Harris strongly advocates organization and co-

operation among physicians to reduce expenses and long hours, to ensure proper advertising and publicity, and to bring about many other private and public benefits.

In closing he says: "It is to be hoped that this communication will cause the members of the medical profession to make a searching inquiry into the weaknesses, the pettiness and the lack of objective and leadership, which characterizes the conduct of our medical and public health societies, and that they will adopt vigorous and, if need be, drastic measures for the correction of these things, to the end that these societies may become the instruments of the cooperative, well organized effort to correct the defects of medical organization and service, and to rout and banish the small politicians who divert such societies from their higher duties to the public and their own membership. We need men of action whose hearts and whose minds are pure and courageous, and who, without personal greed or ambition, will lend themselves to high enterprises in the medical service for the public good and for the economic reorganization of the medical profession. . . "

DEMENTIA IN EPILEPTICS

Although present opinion tends to regard epilepsy as a syndrome from the clinical viewpoint, it nevertheless comprises two distinct groups, namely: epilepsy strictly speaking in which the syndrome dominates the clinical picture, and epilepsy secondary to determined cerebral affection, such as circumscribed lesions or the diffuse lesions of senility. The dementia which accompanies the second group of epilepsy does not present any particular characters. Epilepsy in these circumstances is merely an epiphenomenon superadded to the primary cerebral affection although it may hasten the evolution of the dementia by the addition of intermittent confusional periods which complicate the clinical picture in intervals. The appellation of epileptic dementia is reserved for the deficient states of epileptics belonging to the first group.

In the hereditary antecedents of demented epileptics, Brissot and Bourilhet (*La Démence chez les Epileptics*, Paris, 1921) have usually noted: insanity, epilepsy and alcoholism; in the personal antecedents: infantile convulsions, alcoholic intoxication and serious intercurrent infectious diseases. The age of predilection for the development of epileptic dementia is adolescence, between fifteen and twenty-five years. On the contrary, in organic epileptics, the intellectual decay progresses all the more quickly the older the patient. Given an equal intensity and repetition, the major paroxysms more rapidly lead to dementia than the minor paroxysms.

The most frequent psychic symptoms of epileptic dementia are, in order of importance: intellectual obtuseness, loss of memory and notions acquired by education, loss of judgment and incoherence. Physical signs may be absent, but when they exist they consist of disturbances of speech similar to those of general paralysis, exaggerated patellar reflexes, paresis of the pupil reflexes and paralyses, usually transitory. Tremor of the tongue or limbs is not so common. To these symptoms may be added cicatrices of the tongue or face, facial irregularity and a masklike expression, symptoms which should be regarded as stigmata of epilepsy. The evolution of epileptic dementia is intermittent and its duration indeterminate; if the fatal evolution is not interrupted by an intercurrent disease, death will ensue in terminal marasmus.

As to the clinical forms met with, the following varieties are to be distinguished: intellectual obtuseness which is generally the first phase of the following forms, simple dementia, the pseudogeneral paralysis type, epileptic dementia of the precox form, secondary dementias with epilepsy associated with insanity and lastly the dementia of debilitated epileptics. From the viewpoint of diagnosis, epileptic dementia presenting the pseudogeneral paralysis or dementia præcox forms may give rise to unsolvable difficulties.

Three principal indications govern the therapeutics of epileptic dementia, namely, the continuation of the medicinal treatment of the epilepsy, manual work in the open and an uninterrupted watch over the digestive apparatus. The treatment of epileptic convulsions and vertigo with boric acid has given appreciable results in the hands of Brissot and Bourilhet.

NEW HOSPITAL INFORMATION BUREAU.

A Hospital Information Bureau has recently been organized and established by the United Hospital Fund, with headquarters in the Annex of the New York Academy of Medicine, 15 West Forty-third Street. The object of the Bureau is to keep in touch with hospital work in the city, to furnish information about hospital facilities, administration, organization, record keeping and related facts, to study and make known hospital needs in the city, to maintain a library of hospital reports, statistics, record forms and blanks, to prepare exhibits, to publish annually at least reports about hospitals and hospital work, and, whenever called upon by hospitals, to cooperate in such administrative and efficiency studies as will be of value to both private and municipal hospitals.

The establishment of this valuable service is a result of the survey of hospital work in New York City made by the Public Health Committee of the

Academy of Medicine, of which Dr. Charles Loomis Dana is chairman and E. H. Lewinski-Corwin, Ph. D., is executive secretary.

The survey is notable as the first comprehensive study ever made of hospital facilities in New York City. It answers in detail many questions that have been coming up continuously in connection with the activities of physicians, welfare workers and laymen, such as: How many hospital beds are available to the people of New York? To what extent are present facilities utilized? How much nursing is done in New York hospitals by pupil nurses, by graduate nurses, and by substandard nurses? What percentage of beds do the New York hospitals have for neurological and mental cases? What proportion of the population is sick at any given time? What is the ratio of patients to employees? and many others. The survey and the resulting Information Bureau fill a long felt want in the city, and will serve as sources of valuable information to the people, the institutions, patients, technicians, social workers and philanthropists.

News Items.

International Congress of Ophthalmology.—Dr. George E. de Schweinitz, of Philadelphia, was elected president, and Dr. Luther C. Peter, also of Philadelphia, was elected secretary of this congress, which met in Washington, D. C., April 25th and 26th.

Senate Passes War Hospital Bill.—Through passage by the Senate, Congressional action was completed on May 6th on the bill making immediately available $12,000,000 for construction of hospitals for former service men as a part of a program calling eventually for the expenditure of $17,000,000.

Psychiatrists Wanted at St. Elizabeth's Hospital.—The United States Civil Service Commission announces examinations to fill vacancies in the positions of assistant physician, junior assistant physician and medical intern in St. Elizabeth's Hospital, Washington, D. C. Applications will be rated as received until further notice.

New York and New England Association of Railway Surgeons.—The thirty-second annual session of the New York and New England Association of Railway Surgeons will be held at the Hotel McAlpin, Broadway and Thirty-fourth Street, New York, on Saturday, October 28, 1922, under the presidency of Dr. Donald Guthrie, of Sayre, Pa. A very attractive and interesting program is being arranged for this session.

Personal.—Dr. Homer Smith has moved his office from 276 Madison Avenue to 111 East Thirty-ninth Street, New York.

Dr. Francis X. Mahoney has been appointed health commissioner of Boston, to succeed Dr. William C. Woodward, who resigned recently after serving in that capacity since August 1, 1918.

Dr. S. Josephine Baker has been appointed consultant in child hygiene to the New York State Department of Health.

Röntgenology Laboratorians Wanted.—The United States Civil Service Commission announces examinations for laboratorians and assistant laboratorians in röntgenology to fill vacancies in these positions in the Public Health Service. Applications will be rated as received until further notice.

Nurses Needed by Government.—The United States Civil Service Commission states that there is need for nurses in the hospitals of the United States Veterans' Bureau and the Public Health Service and at Indian schools and agencies. Applications will be received for these positions until further notice.

Germantown Health Centre.—On May 4th the Germantown Health Centre was inaugurated, under the auspices of the Visiting Nurse Society. A medical advisory and working committee of twenty-five physicians are cooperating with the work. Dr. M. J. Karpeles is chairman and Dr. O. J. Day is secretary of the committee.

Class Reunion.—The Class of 1917 of Fordham University School of Medicine held an informal reunion banquet at the Hotel Astor, on Tuesday evening, April 25, 1922. The committee in charge included Dr. Thomas J. McKiernan, president; Dr. Joseph Haas, secretary; Dr. Michael J. Sweeney, Dr. John D. Verrilli, and Dr. Harry Rosenstein.

Westchester County Medical Society Holds Anniversary Meeting.—The Medical Society of the County of Westchester, organized in 1797, celebrated its one hundred and twenty-fifth anniversary on Monday evening, May 8th. Among the speakers were Dr. Frank S. Meara, Dr. Arthur Booth, Dr. George D. Stewart, and Judge J. Addison Young.

American Society for the Control of Cancer.—The following officers have been elected for the year 1922: Dr. Charles A. Powers, president; Dr. George E. Armstrong, Dr. Clement Cleveland, Dr. Livingston Farrand, Dr. Rudolph Matas, vice-presidents; Thomas M. Debevoise, secretary; Dr. Calvert Brewster, treasurer, Sir Arthur Newsholme, honorary vice-president. All these officers held office during the previous year, with the exception of Mr. Calvert Brewer, who replaced Mr. Howard Bayne as treasurer, Mr. Bayne having resigned because of pressure of other duties. Dr. Charles N. Dowd, Dr. John C. A. Gerster, Mr. Calvert Brewer, and Mrs. Samuel Adams Clark, all of New York, were added to the board of directors.

Joint Meetings of Anesthetists.—The American and Mid-Western Associations of Anesthetists will hold a joint meeting at the Hotel Jefferson, St. Louis, May 22d to 24th, and the American Medical Association has accorded the Associated Anesthetists a special anesthesia session in the Section on Miscellaneous Topics. For further information concerning these meetings address Dr. F. H. McMechan, Lake Shore Road, Avon Lake, Ohio, or Dr. Morris H. Clark, Twenty-third and Holmes Street, Kansas City, Mo. The Pacific Coast Association of Anesthetists held its first scientific session in a joint meeting with the Section in Anesthesiology of the California State Medical Society, at Yosemite, Cal., May 15th and 16th, under the presidency of Dr. George P. Waller, of Los Angeles.

Laboratory Aid in Bacteriology.—The United States Civil Service Commission announces an examination on June 7, 1922, for laboratory aid in bacteriology to fill vacancies in the Bureau of Animal Industry, Department of Agriculture, for duty at Denver, Colo.

Deputy Medical Examiner.—The Civil Service Commission of the State of New York announces an examination on June 3d to fill the position of deputy medical examiner, Bureau of Deportation, State Hospital Commission; salary $3,500. Candidates must be physicians licensed to practise in New York State and must have had not less than five years' experience in the practice of medicine including experience in the care of the insane.

Tuberculosis Number of the S. C. A. A. News.—The May number of *S. C. A. A. News* is composed of two sections, the second being devoted entirely to tuberculosis. It contains a record of the tuberculosis work of the State Charities Aid Association since 1907, presenting by counties a statement of the facilities, activities and results obtained during the fifteen years of a vigorous and well organized campaign. The legislative achievements of the State Committee on Tuberculosis and Public Health are also recorded and interesting statistics are presented showing that since the initiation of the campaign against tuberculosis by the State Charities Aid Association, the death rate from that disease has been cut thirty-four per cent.

St. John's Guild Program for 1922.—St. John's Guild opened the Seaside Hospital for Children at New Dorp, Staten Island, on May 8th, for a preliminary four weeks' season for the care of convalescent children. The regular season will open June 5th. Seaside Hospital accommodates three hundred patients, and special clinics will be conducted for the care of children suffering from the following conditions: Cardiac disease; malnutrition; chorea; cervical adenitis; nose and throat disease; defective teeth, and conditions requiring surgical dressings. The Fresh Air Section of the work will be done on the Floating Hospital, which accommodates, comfortably, about one thousand mothers with children. There, the guild is prepared to care for about forty sick babies needing night and day medical supervision.

Western Electrotherapeutic Association.—The fourth annual meeting of this association was held in Kansas City, Missouri, April 20th and 21st, under the presidency of Dr. Curran Pope, of Louisville, Kentucky. The guests of the society included: Dr. James T. Case, of Battle Creek, Michigan; Dr. E. C. Henry, Omaha, and Dr. Paul Gardner, president of the Medical Society of the Missouri Valley. The following officers were elected for the ensuing year: President, Dr. T. Howard Plank, of Chicago, Ill.; first vice-president, Dr. H. H. Bowing, of Rochester, Minn.; second vice-president, Dr. M. P. Springer, of Tulsa, Okla.; treasurer, Dr. W. P. Grimes, of Kansas City, Mo.; registrar, Dr. J. R. Shumway, of Pleasanton, Kansas; board of trustees, Dr. Frank J. Iuen, of Kansas City, Mo.; Dr. Curran Pope, of Louisville, Ky. The next meeting will be held in Kansas City, Missouri, in April, 1923. Dr. Charles Wood Fassett is secretary.

Annual Meeting of the A. M. A.—The next annual meeting of the American Medical Association will be held in St. Louis, Mo., May 22d to 26th, under the presidency of Dr. Hubert Work, of Pueblo, Colo. Dr. George E. de Schweinitz, of Philadelphia, is president elect, and Dr. Frank B. Wynn, of Indianapolis, is vice-president. Other societies which will meet in St. Louis at this time are: American Association of the Feebleminded, May 18th to 20th; American Association of Industrial Physicians and Surgeons, May 22d and 23d; American Proctologic Society, May 22d; Association for the Study of Internal Secretions, May 22d; Medical Library Association, May 22d and 23d; Radiological Society of North America, May 19th and 20th; Air Service Medical Association of the United States, May 23d.

Medical Advisor to State Insurance Fund.—Among the positions for which the New York State Civil Service Commission will hold examinations on June 3d is that for medical advisor, State Insurance Fund, Department of Labor; $3,250. Candidates must be licensed medical practitioners in this state and must have had at least six months of hospital experience. They must have an acquaintance with the principles of workmen's compensation and the provisions of the law relating to the same; and must be thoroughly informed on the theoretical and practical sides of medical service administration, including the examination of cases and the determination of the nature, probable duration and extent of disability; the organization of medical and hospital arrangements for the treatment of injured employees; the determination of fees for medical service and questions in general arising out of the relation between the insurance carrier, the employer, the employee and the medical profession.

Fox Hills Hospital to Be Sold.—The Government's hospital at Fox Hills, Staten Island, which was vacated recently by soldier patients being treated by the Public Health Service, will be sold at public auction on Friday and Saturday, May 26 and 27, in accordance with arrangements made yesterday by the Treasury Department through the United States Veterans' Bureau. The group consists of eighty-four buildings, and the conditions of the sale provides for their removal by July 30th. The hospital's patients have been transferred to other hospitals and Public Health Service institutions.

Fox Hills Hospital was completed in the spring of 1918 at a cost of about $2,500,000, and from that time until early this year, when it was ordered closed, it had been a source of constant annoyance to the Government because of protests against the environment and the service that was being accorded to the disabled veterans.

Died.

CABELL.—In Richmond, Va., on Sunday, May 7th, Dr. Robert G. Cabell, aged seventy-four years.

MCCORMACK.—In Louisville, Ky., on Thursday, May 4th, Dr. Joseph N. McCormack, aged seventy-four years.

SCHOONMAKER.—In New York, on Friday, April 28th, Dr. Perry Schoonmaker, aged sixty years.

SUTTON.—In Hamburg, Germany, on Wednesday, March 29th, Dr. McWalter B. Sutton, aged forty-nine years.

Book Reviews

RADIOTHERAPY IN SKIN DISEASES.

X Rays and Radium in the Treatment of Diseases of the Skin. By GEORGE MILLER MACKEE, M. D. Illustrated with Two Hundred and Fifty Engravings and Twenty-two Charts. Philadelphia and New York: Lea & Febiger, 1921.

Dr. MacKee offers a detailed critique of x ray physics and radium which leads to a compact and relatively thorough understanding for the basis of x ray and radium dosage. Some of the physical discussion is probably irrelevant and is apparently included for the insurance of completeness rather than for practical necessity. This is followed by a presentation of diseases of the skin in which radium or the x ray is used with success. The diseases include certain infections by organism and fungi; eczema; psoriasis; lichen planus; pruritus; nevi; benign growths; malignant growths; tubercle infections; and other miscellaneous affections. A medicolegal chapter points out the legal relation between physician and patient as adjudicated in many cases in various courts.

It is easy to observe that the author has a brilliant clinical experience in dermatology and an unusually comprehensive grasp of the possibilities and limitations of x rays and radium energy. For the dermatologist there is probably no more authoritative text on the x ray and radium treatment of skin diseases; but it is felt that the book presents a more general and exceptionally useful purpose in its instructions on the physics and concepts of x ray dosage by which every x rayist and radiotherapist should be guided. It is difficult to commend this book too highly.

ANNALS OF RÖNTGENOLOGY.

Annals of Röntgenology. A Series of Monographic Atlases. Edited by JAMES T. CASE, M. D. Volume II: The Pathological Gallbladder Röntgenologically Considered by ARIAL W. GEORGE, M. D., and RALPH D. LEONARD, M. D. New York: Paul B. Hoeber, 1922.

This is the second of the volumes in the series of Annals of Röntgenology. The technic is summarized by considering the preparation of the patient, the important factor of which being that the patient present himself for examination with an empty stomach. Double intensifying screens and duplitized films are important. The Potter-Bucky diaphragm is considered of material help. The interpretation is based on direct evidence wherein gallstones will show as peripheral shadows, by which is meant the ringlike appearance of the stones. Roberts's classification of gallstones is presented as clinically useful and practical. The authors persist in their contention that the visualization of the gallbladder silhouette on the x ray film is indicative of gallbladder pathology. It is difficult to subscribe to this premise. With the advent of the fine focus Coolidge tube, the duplitized film, the speedy and practically grainless intensifying screen, and the Potter-Bucky diaphragm it is conservative to say that the gallbladder can be outlined irrespective of pathology in a rather large number of individuals.

Indirect evidence is useful in inferring gallbladder disease. It includes deformities due to pressure; secondary changes incident to adhesions; fixation of organs; spastic changes in the stomach; and, occasionally, obvious demonstrable changes in the gallducts. The writers lay claim to about eighty-eight per cent. of correct diagnosis in one hundred and twenty-eight operative cases. There are also, in this series, eight erroneous inferences on the negative aspect and seven on the positive.

The text is followed by an atlas that illustrates beautifully the major themes of the text. The general ensemble of the publication is to be commended; but it can not be conceded that its contributive value to the library of interpretative röntgenology is comparable with that of its mate volume on the mastoids.

X RAY DIAGNOSIS.

Grundriss der Gesamten Röntgendiagnostik innerer Krankheiten für Arzte und Studierende. Von Dr. FRITZ MUNK, Privat-Dozent an der Universitat Berlin. 2. verbesserte Auflage. Mit 193 Abbildungen. Leipzig: Georg Thieme, 1922.

This is the second edition of Dr. Munk's *Röntgen Diagnosis.* The first third of the book is devoted to elementary x ray physics and technic. The remainder of the book has to do with diagnosis. It is illustrated with line cuts and reduced röntgenograms. It is a general text excellently adapted for a difficult survey for the essentials of röntgen diagnosis.

A TEXTBOOK ON EPIDEMIOLOGY.

Epidemiology and Public Health. A Text and Reference Book for Physicians, Medical Students and Health Workers. In Three Volumes. By VICTOR C. VAUGHAN, M. D., LL. D., Chairman of the Division on Medical Sciences of the National Research Council. Assisted by HENRY F. VAUGHAN, M. S., Dr. P. H., Commissioner of Health of the City of Detroit, and GEORGE T. PALMER, M. S., Dr. P. H., Epidemiologist to the Department of Health of the City of Detroit. Volume I: Respiratory Infections. St. Louis: C. V. Mosby Company, 1922.

There are few persons who have had the extensive experience with the infectious diseases that is recounted by the distinguished author of this work in his preface. During a period of more than fifty-five years he has come into intimate personal contact with numerous epidemics, as a practitioner, a health officer, as a member of a special commission, or merely as an observer. In that time he has acquired a vast amount of information by observation, experimentation and study. His opinions and ideas have crystallized, the process having been facilitated no doubt, by his experience as a teacher, and are presented to us in this work of which the first volume has appeared. This volume is devoted to the respiratory infections, that is, those infections in which the virus most frequently enters the body through the respiratory tract. It is planned that the remaining infections shall be presented in the second volume and that the third volume shall be devoted to public health problems.

The author gives us a brief but ample discussion of the history of each infection, a proper discussion of its bacterial or other specific cause, and a few words concerning the pathology and symptomatology of the disease. The bulk of the text is given over

to the discussion of epidemiology proper and a presentation of the methods by which control of the disease may best be obtained. His broad experience and sound judgment have made these portions of the work of exceptional value especially to health officers. An introductory chapter deals with his own theory as to the part played by protein split products in the development of infection and immunity and the production of symptoms. While this theory has perhaps not been accorded general acceptance, it certainly has sufficient experimental foundation to enable it to demand serious consideration. This volume is the most important on this subject that has appeared in many years.

PSYCHOPATHOLOGY.

Mind and Its Disorders. A Textbook for Students and Practitioners of Medicine. By W. H. B. Stoddart, M. D., F. R. C. P., Lecturer on Mental Diseases to St. Thomas's Hospital Medical School; Examiner in Psychology and Mental Disease to the University of London; Honorary Consulting Physician in Mental Diseases to the War Office, etc. Fourth Edition, with Illustrations. Philadelphia: P. Blakiston's Son & Co., 1922.

Dr. Stoddart was one of the first English psychiatrists to embrace psychoanalysis and has even given lectures on the subject. Always a keen observer and a diligent worker in his field, previous editions of this work have been eagerly welcomed. To the student of psychiatry be he undergraduate or physician the present volume will be a mine of information.

The chapter on diseases of the insane is excellent and might well be longer. The same may be said of the one on general treatment except for its too enthusiastic advocacy of drugs. The chapter on malingering is excellent and should be longer. More space than twelve lines should be given to the psychopathology of dementia præcox. His chapter on paranoia is especially good, but needs at least one lengthy case report. This in fact is a fault of the whole book; symptoms and syndromes are described, the former are exemplified, but the latter are only illustrated by crosssection glimpses and no life histories are quoted.

The chapters on alcoholic and drug addictions are misplaced in the book and in the parts devoted to opium and cocaine occur many mistakes, e. g., the assumption that the cure of the morphine habit is conditioned by the amount taken daily (page 410). This is not true. It depends more on six other thing: the duration of the addiction, the original cause, the patient's physical and nervous condition, the method of treatment used, the desire of the patient to be cured and the personality of the physician. Stoddart mentions the gradual withdrawal method which is extremely unsatisfactory, but he himself recommends the abrupt method which is barbarous and wholly unwarrantable.

With some of Stoddart's statements, both in psychology and phychopathology, many of the modern American psychiatrists would perhaps quarrel: his placing of the herd instinct above the sex instinct (page 76), his statement that women are altruistic, men egoistic (page 114), that there is a double hemiplegia in melancholia (page 166), that sex perversion is present in twenty-five per cent. of supposedly normal individuals (page 176), that the choice of art as a career means mental instability (page 202), that degeneration is not seen in savage races (page 203), that gigantism is not associated with mental disease (page 427), and so on.

He also differs from the American school in other ways. Thus, he describes catatonia major, catatonia minor, catalepsy and catatonia as separate entities. His division of manic depressive psychoses into periodical and intermittent serves no useful purpose. The undesirable term amentia is applied to imbeciles. Likewise he recognizes a moral imbecility, a misleading concept, and neglects the whole field of constitutional psychopathy.

A few minor criticisms are: *folie á deux* could be dismissed in a few words instead of three pages. In his chapter on combined psychoses he does not mention the combination of some other psychosis with a syphilitic one, the most frequent combination of all.

ORIGIN AND DEVELOPMENT OF NERVOUS SYSTEM.

The Origin and Development of the Nervous System from a Physiological Viewpoint. By Charles Manning Child, Professor of Zoölogy, University of Chicago. Chicago: The University of Chicago Press. 1921. Pp. xvii-296.

Child has here carried the theory of the axial gradient as the physiological condition of differentiation in growth to the explanation of the development of the nervous system. His effort is to keep before the mind the conception that development is a physiologically continuous process. In such a process one can understand through the quantitative differentiation in growth which the axial gradient represents how such a specialized organismic pattern can arise as that of the central nervous system. The inherent properties of protoplasm are excitation and transmission. These are found in the organismic forms of protoplasm, which are less simple but not different in nature from the primitive protoplasm. External factors exert a differential response on the part of these properties of excitation and transmission, so that the highly centralized form of the nervous system is merely a specialized response to environment on the part of these inherent properties. The nervous system becomes thereby the chief organ of the excitation and transmission so necessary for the life of the organism and the chief organ of the physiological integration. The axial gradient is merely the pattern, it simply is a statement of the fact of such a development, and of the carrying within it of hereditary potentialities.

Child therefore avoids any artificial introduction of a nervous system, he introduces no confusing theories of heredity. He attempts to maintain this simple attitude toward the physiological process which viewed in this way is sufficient to account for the high degree of differentiation in the nervous system. His way is followed with proofs but he propounds no conclusions as final. He is rather interested in the active following out of such a point of view with the suggestive possibilities opened up for psychology as well as in physiology and anatomy.

ABDOMINAL PAIN.

Abdominal Pain. By Prof. Dr. Norbert Ortner, Chief of the Second Medical Clinic at the University of Vienna. Authorized Translation by William A. Brams, M. D., Formerly Lieutenant Commander, Medical Corps, U. S. N., and Dr. Alfred P. Luger, First Assistant, Second Medical Clinic, University of Vienna. New York: Rebman Company, 1922.

This work has to do with abdominal pain as a symptom and the help it gives toward a correct diagnosis and subsequent successful treatment of the pathological condition present. In studying the subject the author adopts a topographical division—diffuse pain, pain in the epigastrium, right hypochondrium, right ileocecal region, etc., and under each of these heads considers the various kinds of pain—colicky, continuous, acute, not cramplike pains of short duration, recurrent pains, etc. In a final chapter, however, the process is reversed and abdominal pain is studied from the point of view of its character and associations—radiating pain, relation of pain to the intake of food, to defecation, to bodily motion, to constipation, to menstruation, etc. The author has covered his subject most thoroughly and has made a book that cannot fail to be of great assistance to the physician, especially the young one whose experience is not wide, in solving many a puzzling case of abdominal pain. The translation is in good English, free from the Teutonisms which so often mar the renderings from German into English.

POPULAR HEALTH EDUCATION.

Health and Efficiency. By Thomas Darlington, Ph. B., C. E., M. D., Professor of Anatomy, New York College of Dentistry; Consulting Staff, Broad Street Hospital; Chairman, Greater New York Medical Association for Borough of Manhattan; Formerly Commissioner of Health and President of the Board of Health, New York City. New York: Wynkoop-Hallenbeck-Crawford Company, 1922. Pp. 262.

Dr. Darlington himself states the purpose of his book as follows: "To present the reasons for, and the application of, the principles of physiology to the human machine in everyday working and living conditions. It is written also, partly as an ancestral obligation to some of those hardy pioneers who in the early years of our country helped to build for future generations." And elsewhere: "Much repetition will be found. . . . This has been deemed necessary in order that a lay reader may intelligently follow the subject." This last sentence connotes perhaps the chief criticism of the work—the effort to be "popular" seems at times a bit overdone; however, this is better than erring on the other side, as we realize when we consider the astonishing and ofttimes abysmal ignorance of the simplest health precepts on the part of the great mass of people for whom Dr. Darlington writes. Another minor fault strikes us toward the end of the book. Part of the theoretical side of the author's psychology in the chapter entitled Influence of the Mind Over the Body smacks a bit of the old fashioned school.

In scope Health and Efficiency covers the entire subject of personal hygiene, with the exception of the questions of alcohol, tobacco, venereal disease and sex. To explain these omissions the writer says: The passage of the Eighteenth Amendment makes education on the subject of alcohol the duty of the state. For the law can never be enforced until the citizens in general believe that the making of such a law was necessary. Were I to talk of the evils of tobacco no one would listen; and literature upon all sex questions can readily be obtained from departments of health, or societies which deal exclusively with such matters." These reasons seem hardly to justify the omission of discussion of such important health problems, concerning which the public are so sorely in need of proper enlightenment.

However, in spite of its few shortcomings, Dr. Darlington's book fills very definitely one of the long felt needs of medical service, namely, popular education in matters pertaining to health. The presentation of the subject is clear and simple, and the directions given are very definite and practical. The reader is struck with the large number of allusions to literature, the Bible especially, made by the author to "point his moral." Every public library would do well to have *Health and Efficiency* on its shelves and make a point of circulating it to the general public.

DRUG ADDICTION.

Opiate Addiction: Its Handling and Treatment. By Edward Huntington Williams, M. D., Assistant Physician, New York State Hospital System; Special Lecturer on Criminology and Mental Hygiene, State University of California. New York: The Macmillan Company, 1922. Pp. 194.

The author presents his subject simply, clearly and practically. His introduction is a rather full discussion of the Harrison Narcotic act and the results and failures of its enforcement. He feels that the best practical solution of the addiction problem would be to place it unreservedly in the hands of the United States Public Health Service. It could then be controlled by intelligent physicians who would have legal authority to enforce necessary clinical and custodial measures, and also have the facilities to work out unhindered its laboratory and clinical problems. Williams believes that, although gradual reduction has some advantages for special cases, any patient who can be treated successfully by this method can be treated with equal success, and perhaps more satisfactorily, by one of the sudden withdrawal methods. He feels that of these the Bishop method is the most suggestive, in spite of certain disadvantages, of the lines of future clinical and therapeutic development of addiction treatment.

HEREDITY.

Human Heredity. By Casper L. Redfield, Author of *Control of Heredity, Dynamic Evolution, Great Men,* etc. Chicago: Heredity Publishing Company, 1921.

In the beginning of this book Redfield points out that Darwin specifically disclaimed any knowledge of or theory in regard to the evolution of brain power and consequently the Darwinian theory has no relation to the subject matter under discussion. The first chapter deals with the processes by which the powers of protoplasm are modified either toward increase or decrease of powers. Then follow several chapters which show the result of applying these processes to concrete cases. Mr. Redfield shows that by continuous exercise, animals and plants develop powers which they did not possess before,

and frequently develop powers which never existed in any ancestor, and furthermore that these acquired powers are to some extent transmissible. It is because of this fact that human race has developed to its present degree of civilization. A formidable array of evidence is produced to show that the child profits intellectually when the father gets his education before he becomes a parent; in fact, that all the chances of achieving greatness are on the side of the latest born in a family. Mr. Redfield treats his subject in a thoroughly scientific way and has as his aim the improvement of the mental, physical and vital qualities of the human race. We anticipate that advocates of birth control will have a rather busy half hour refuting some of Mr. Redfield's arguments.

PERIPHERAL NERVE INJURIES.

The Surgery of the Peripheral Nerve Injuries of Warfare. By Harry Platt, M. S. Lond.), F. R. C. S. (Eng.). New York: William Wood & Co., 1921.

This volume comprises two Hunterian Lectures delivered before the Royal College of Surgeons of England, delivered on February 7 and 9, 1921. The first lecture was limited to physiological and anatomical considerations, such as nerve regeneration, nerve topography, and blood supply of nerve trunks; pathological considerations, such as the spontaneous neurotization of muscles; clinical considerations including diagnostic methods and clinical syndromes. The second lecture is devoted to the indications for surgical intervention, operative technic, and choice of operations. Analysis of over 500 operations are given with reference to end results. There are a number of excellent photographic illustrations. Medical men who buy monographs will find this one in the front ranks.

A TEXTBOOK OF BACTERIOLOGY.

A Textbook of General Bacteriology. By Edwin O. Jordan, Ph. D., Professor of Bacteriology in the University of Chicago and in Rush Medical College. Seventh Edition, Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1922.

This excellent treatise on bacteriology, which includes pathogenic protozoology, is so well known to the medical profession through its six editions since 1908 that we need only note here the principal changes made in this new edition. The author states that the chapters on the Methods of Studying Bacteria, Influenza, and Anaerobes have been entirely rewritten while those on Streptococci, Pneumococci, Typhus Fever, Immunity and Yellow Fever have been very thoroughly revised. Minor changes have been made in other chapters. If a criticism might be made of Professor Jordan's work it is that in treating of the individual diseases and their pathogenic organisms he is dogmatic in asserting a true relationship between the two. The reader of a descriptive treatise of this kind likes to meet with positive statements, and the sensation of being balanced between the conflicting guesses of various observers is not pleasant. Not that the author must necessarily commit himself in doubtful cases, but he might at least indicate on which side he thinks the weight of evidence falls. However, some readers may prefer to form their own judgments and are content to have the evidence spread out before them.

COMPENSATION

Memoirs of a Midget. By Walter De La Mare. New York: Alfred A. Knopf, 1922.

Memoirs of a Midget is one of the really great books of recent years, and has a special interest in that it is a novel written by a man whose previous fame has rested on his ability as a poet. Miss M is a tiny but charming and exquisite bit of humanity who, the reader is led to believe, is somewhat less than two feet high. Her life, portrayed with such vividness, colorful beauty and delicacy of style, has been given by enthusiastic reviewers the most widely varying interpretations—a tribute to universal human appeal of the book. Probably to the physician the book will be of greatest interest as a personality study. Although Miss M is so decided a variation from Nature's socalled norm, and in spite of the fact that, for this reason, life among ordinary people often brings the most intense suffering to her unusually sensitive nature, nevertheless, because of the strength of a fine, wholesome character and a forceful will, Miss M succeeds in creating a life of no small degree of usefulness and beauty, not only for herself, but for many of those with whom she comes in contact. This life of hers is shown as a direct contrast to that of her beloved friend, Mr. Anon, also a midget, who allows his hypersensitiveness to make a hermit of him; also to that of Fanny, who to all appearances is a beautiful normal woman, but whose utter heartlessness and lack of certain moral attributes separate her from real life and the rest of humanity much more distantly than Miss M is separated. After reading the book one feels that life, no matter how hard and difficult it seems, may often be made worth while, even by and for some of those who appear to be most sorely handicapped.

PSYCHOLOGY.

The Psychic Health of Jesus. By Walter E. Bundy, Ph. D., Associate Professor of English Bible in De Pauw University. New York: The MacMillan Company, 1922. Pp. xviii-299.

After extensive and impartial quotations from the many psychological studies of the life of Jesus, Bundy states that most of these works are of little value and that more information may be had from a careful reading of the first three chapters of the New Testament than from any other source.

ROMANCE.

Nightfall. By Anthony Pryde, Author of *Jenny Essenden* and *Marqueray's Duel.* New York: Dodd, Mead & Co., 1921. Pp. 376.

The man with a not too shady past and the beautiful pastor's daughter live their romance in postwar England. Nobody works in this book; they all have stupendous incomes. But they left large parts of themselves on the battlefields, so one does not grudge them their leisure. The heroine, after years of domestic scrimping, dares to marry the millionaire and will doubtless live happy ever after. Quite a sprightly character is Isabel Stafford. She moves through the pages of the book by her own momentum and is real. The plot of the story is much complicated by war hysteria, helpless husbands, long suffering wives. *Nightfall* is a thoroughly enjoyable romance where everything turns out right in the end.

Medicoliterary Notes.

In the *Forum* for April are two articles on topics related to medicine: *Is Drink Killing England?* a plea for prohibition by Elizabeth Banks; and *The Transgressor's Easy Way*, a discussion of some of the causes of crime and methods of prevention, by Burdette G. Lewis, State Commissioner of Institutions and Agencies of New Jersey. Mr. Lewis has also an article in the *American Review of Reviews* for April entitled *Winning the Fight Against Mental Disease.*

* * *

Insects as Chemists is the title of a very interesting article in the English *World's Work* for February. Among the chemical secretions of insects are the silk forming fluid made by spiders and caterpillars, beeswax, the poison acid injected into stings by ants, spiders, bees, wasps and some caterpillars, the gaseous vapors emitted by the musk beetle and the bombardier beetle, the milk of bees, etc.

* * *

An interesting experiment is being carried on at Schloss Elman, twenty miles from Oberammergau. Dr. Johannes Mueller, founder and director of the institution, in a recent article in the *Vossische Zeitung*, states that his plan is not to conduct a hospital or sanitarium, but to afford a home for cases needing mental treatment. His methods, he says, are the simplest, based on common sense, the beneficial influence of art, literature and music, and especially the bringing of the patient in contact with as many types as possible of fine and interesting personalities. No chronic or violent cases are accepted.

* * *

The National Committee for Mental Hygiene has recently compiled for distribution to those interested an excellent list of books on mental hygiene suitable for use in public libraries.

* * *

Taboo, a play by Mary Wiborg, produced recently in a series of special matinees by Augustus Duncan, did not fulfill its promise of interest. The cast included both white and colored actors, and most of the honors belong to the latter. The plot is muddled and none of the acting was in any way noteworthy. The one really interesting thing about the play was that it revealed the great dramatic possibilities in the representation of the almost extinct Voodoo rites as practised by the once superstition ridden Louisiana negro ceremonies, now of significance as relating to a phase of American folklore.

* * *

George Bernard Shaw's *Back to Methuselah*, presented by the Theatre Guild, is one of the dramatic milestones of the year. It is a modern elucidation of the old saying, "Faith can move mountains." Shaw believes that evolution, which, outside of human direction, is haphazard, should be made by man an ordered, conscious, scientific process. Man as a biological product can, he thinks, by the exercise of his mental faculties and his will, not only live as long as he wishes, but also make of himself and his life throughout future ages what he wishes. Moreover, if he proves unworthy of his possible destiny, Nature may cast him on the scrap heap and substitute another form of life through which to express her high purpose. Another thesis which Shaw tries to establish is that the trend of civilization is from action to argument. This is most cleverly demonstrated by the two actors satirizing Lloyd George and Asquith.

* * *

The *New York Times Book Review and Magazine* for April 16th contains an interesting article by Maurice Francis Egan based on the *Reports of the Servants for Relief of Incurable Cancer*, covering the period from January, 1908, to October, 1912, and from January, 1921-1922. Two homes are maintained for the care and treatment of the poor suffering from incurable cancer, one at Hawthorne, N. Y., near White Plains, and another for patients too ill to leave New York City, at 71 Jackson Street. No payment from patients is allowed, and the homes aim to provide "no fewer comforts and consolations than the rich have." The founder and head of the homes is Rose Hawthorne, known to her patients as Mother Alphonsa. She is the daughter of Nathaniel Hawthorne, and the review quotes a statement from her as to how greatly the influence of her father's broad and never failing sympathy for all sufferers was directly responsible for her choice of her present work and her abandonment of all her former literary and artistic activities. Another strong influence was the early death from malignant cancer of the dearly loved friend of her youth, the talented Jewish poetess, Emma Lazarus.

New Publications Received.

THE AUTONOMIC NERVOUS SYSTEM. By J. N. Langley. Part I. Cambridge: W. Heffer & Sons, Ltd., 1921. Pp. 80.

THE PRIVATE CHARACTER OF QUEEN ELIZABETH. By Frederick Chamberlin. New York: Dodd, Mead & Co., 1922. Pp. xxi-334.

LES OCCLUSIONS AIGUES ET SUBAIGUES DE L'INTESTIN CLINIQUE. Par A. G. Guillaume. Paris: Masson et Cie, 1922. Pp. 304.

HANDBOOK FOR THE LIMBLESS. Edited by G. Howson. Foreword by John Galsworthy. London: The Disabled Society, 1921. Pp. xiii-245.

L'AMEE THERAPEUTIQUE MEDICATIONS ET PROCEDES NOUVEAUX. Par le Dr. L. Cheinisse. Deuxieme Amee, 1921. Paris: Masson et Cie, 1922. Pp. 152.

BOOK ON THE PHYSICIAN HIMSELF FROM GRADUATION TO OLD AGE. By D. W. Cathell, M. D. Baltimore, Md.: D. W. Cathell, M. D., 1922. Pp. 359.

PRACTICAL ORGANOTHERAPY. By Henry R. Harrower. Third Edition. Glendale, Cal.: The Harrower Laboratory, 1922. Pp. 416.

DISEASES OF WOMEN. By Ten Teachers. Edited by Comyns Berkeley, H. Russell Andrews, J. S. Fairbairn. Illustrated. Second Edition. New York: Longmans Green & Co., 1922. Pp. xi-641.

THE TREATMENT OF COMMON FEMALE AILMENTS. By Frederick John McCann, M. D. London: Edward Arnold & Co., 1922. New York: Longmans, Green & Co. Pp. vii-152.

LA REACTION DU BEJOIN COLLOIDAL. Et les reactions colloidales du liquide cephalo-rachidien. Par Georges Guillain. Paris: Masson et Cie, Editeurs, 1922. Pp. viii-143.

Practical Therapeutics

REPORT OF A SERIES OF CASES DEMONSTRATING THE THERAPEUTIC AND FOOD VALUES OF YEAST.

By Commander I. S. K. Reeves,
Santo Domingo, Dominican Republic,
Medical Corps, U. S. Navy.

To arrive at reliable conclusions in regard to the therapeutic and food values of yeast, the most desirable conditions exist in large institutions.

During the year 1920 and preceding years at the United States Naval Academy, a loss in routine work was occasioned by the number of midshipmen who suffered from boils. This condition had existed for years and all methods of prevention were found of little avail. The yeast treatment was suggested by the return of one midshipman from extended sick leave given on account of numerous and persistent boils. He was well, had gained forty pounds in weight, and said he had been cured by yeast.

In 1921 the use of yeast on a large scale was begun. It was given in the form of an ordinary yeast cake after each meal, some eating it as cheese, some masticating it and using water as a vehicle. The list on treatment rapidly increased, and as they were all given treatment at their own request, it would appear they perceived good results in their associates. A total of one hundred and thirty midshipmen took yeast regularly three times a day for several weeks and the following results were noted:

Forty-five were suffering from boils, the majority having had them for some time. Of these, thirty were rapidly cured, continued the treatment, and the boils ceased to occur.

Fifty-five took treatment to increase their weight. Thirty of these gained weight, one named above gained forty pounds, one ten pounds, ten gained five and ten pounds, and eighteen from one to five pounds.

Of twenty-two cases of acne, three were cured, seven patients improved considerably and seven increased in weight, but the acne remained the same, and five showed no results. All acne cases were also treated locally with Vleminckx solution.

Six took yeast for constipation, four were cured, two improved and continued treatment.

Four requested to try the treatment, stating they had indigestion; two reported themselves cured and two were still under treatment. The nature of these cases was not investigated, so diagnosis is obscure.

All men taking yeast were below par when they began, which might show only slight gains.

In the cases which were cured, the boils did not recur up to date of observation, which was two months later.

During ingestion period, the improvement in practically all cases indicated its value as a food ingredient.

The incidence of boils among midshipmen has undoubtedly been reduced to a remarkable extent by the treatment.

Almost invariably increase in weight and improvement in general conditions have occurred during treatment.

While the results of the treatment in cases of acne are doubtful, the results were such as to warrant further trial.

In constipation and indigestion, the results were good, but there were not cases enough to warrant conclusions in these conditions.

Of all patients taking yeast, no one complained of any ill effects nor have any been noted.

The willingness of large numbers of men to take this treatment would indicate their confidence in its therapeutic and food value.

Experimental Rickets in Rats.—H. C. Sherman and A. M. Pappenheimer (*Journal of Experimental Medicine*, August, 1921) regularly produced rickets in young rats with a simple diet consisting of patent flour, calcium lactate and sodium chloride, with or without ferric citrate. When 0.4 per cent. of potassium phosphate was added to this diet to replace a small part of the calcium lactate, the development of rickets was completely inhibited. Quantitative chemical analysis of calcium in the bodies of parallel rats showed a marked increase of calcium content in the rats receiving the added phosphate over those developing rickets. Pappenheimer and Sherman say that while x ray and histological examinations and quantitative chemical determinations show that added potassium phosphate increased the assimilation and normal deposition of calcium, the quantitative relationship between the inorganic ions rather than actual deficiency of any one of them may be the determining factor in the cause or prevention of rickets.

Production of Rickets by Diets Low in Phosphorus and Fat-soluble A.—E. V. McCollum, Nina Simmonds, P. G. Shipley and E. A. Park (*Journal of Biological Chemistry*, August, 1921) describe two faulty rations, containing two per cent. added calcium carbonate, which produced pathological conditions in the skeleton of rats essentially the same as those in human rickets. A small quantity of butter fat added to the ration, while insufficient to prevent the development of xerophthalmia, delayed its occurrence and its rate of progress. A diet having a higher calcium phosphate ratio than the others produced the most extreme degree of rickets. Observations have been made repeatedly by the authors that if calcium carbonate in large amounts (three to six per cent. of the whole ration) is added to a ration insufficiently supplied with the organic factor and only slightly or not at all deficient in its phosphorus content, most pronounced changes occur at the end of the long bones. The recent work of Sherman and Pappenheimer is discussed, in which rickets was produced in rats by means of diets containing patent flour, ninety-five per cent.; calcium lactate, three per cent.; sodium chloride, two per cent.; with or without the addition of one tenth per cent. ferric citrate. An addition of potassium phosphate in amounts equaling four tenths per cent. of

the total prevented the development of rickets, and when no calcium was added to the faulty ration osteoporosis instead of rickets developed. In commenting upon this McCollum and his coworkers say that patent flour is one of the most deficient foods entering into the human diet, and that the ration employed by Sherman and Pappenheimer was deficient in fat-soluble A, water-soluble B, its protein content, potassium, phosphate, and water-soluble C. In the presence of so many deficiencies it is difficult to say which was operative in the production of rickets. It is stated by McCollum and his associates that apparently in the rat the profound disturbances in the deposition of lime salts in cartilage and bone and the changes in the cells of those tissues which give rise to the pathological complex known as rickets may be produced by disturbances in the diet of the optimal ratio between calcium and phosphorus in the absence of an amount of an organic substance contained in codliver oil sufficient to prevent them. It would seem from the results of a large number of experiments, which will be published in detail soon, that in so far as calcium and phosphate are concerned, the physiological relation in the diet between the two is of infinitely greater importance in insuring normal calcification than the absolute amounts of the salts themselves.

Nutrition Clinics.—J. B. Manning, H. L. Moon, H. C. Schumacher (*Archives of Pediatrics*, October, 1921) quote Retain's statement that the measure of nutrition is the best single indication of a child's state of health, and that much knowledge as to their general status can be obtained by a series of weight observations. It must be realized that the steady period of growth during the first six years of life is followed by active skeletal growth and a rapid increase in length between the sixth and ninth years. After a slower increase in length and breadth up to the eleventh year a period of more active gain in both weight and height follows between the eleventh and sixteenth year. This is a specially critical period, since latent tuberculosis often becomes active and chlorosis develops in girls. The authors report the interesting general finding that children on the Pacific Coast are above the average weight and height charts as scheduled by Emerson's and the Government's tables. Clinical experience has shown that the limits of the normal weight range should be fixed at seven per cent. below and twenty per cent. above the average. It has also been found that children generally did better at ten per cent. above the average level. Investigations based on these standards showed that the substandard condition of underweight children was manifested by lines under the eyes, fatigue, bad posture, pallor, adenoids, cervical glands, atonic musculature, visceroptosis, flat chest, signs of rickets, and nervous disturbances. Of 1,700 pupils in three public schools seventeen and a half per cent. were underweight. This figure, therefore, corresponds to the general findings in the country. In conclusion the authors urge the national importance of skilled examination of all school children, treatment of all physical defects and institution of nutrition classes for the instruction of children combined with efforts to spread better knowledge among parents.

Silica, Lime, and Magnesia in Cancerous Tissue.—Albert Robin (*Bulletin de l'Académie de médecine*, January 31, 1922) treated each of three cancer patients with preparations containing lime, magnesia and silicates. Chemical examination of the tumors postmortem showed that the quantity of silica in the tumors had been increased by fifty-eight per cent., that of lime by thirty-four per cent., and that of magnesia by six per cent. Thus, cancer tissue seems to have a particular tendency to fix silicates. Silica constitutes the most essential mineral constituent of connective tissue, the firmness of which varies according to the amount of silica it contains. Overgrowth of connective tissue, in turn, constitutes one of the factors in the defense of the system against cancer. Consequently it may be advantageous to supply an excess of silicates in cancer cases. In cancers undergoing retrogression the lime content rises sharply. In slowly progressive cancer of the liver, magnesia accumulates in the portions of the organ not yet involved; this suggests the possibility that resistance to the tumor by these tissues may be due to their high magnesia content. In the author's three test cases lime was given in the form of the glycerophosphate, 0.5 gram upon awakening in the morning; before the lunch and dinner, one gram of magnesium hydroxide was taken with a little water; during the same meals a cachet containing five grams each of sodium and potassium silicate and ten grams of magnesium silicate was ingested.

Effect of Foods, Accessory Foods, and Spices on the Pulse and Heart Respectively.—M. Heitler (*Wiener klinische Wochenschrift*, March 23, 1922) conducted a series of investigations to determine the effects of various foods, beverages, condiments and spices, as well as the effect of cooking, chewing and digestion upon the pulse and cardiac activity, and found that all the foods, accessory foods and spices, with the exception of very acid substances, coffee, tea and cocoa, had a stimulating effect on the heart. Water inhibits the depressive effect of stimulants from heating. The depressive substances become stimulants by their mixture with stimulants (in which sugar plays an important part), or their action is diminished. The depressive substances become stimulating after they are heated and water increases the stimulating effect. If the substance tested is applied to the palate the effect is greater than when applied to the mucosa of the cheek. Different portions of the same vegetables have different effects. Acids applied to the tongue cause depression of the pulse, applied to the mucosa of the cheek and palate they cause an increase of the pulse, but applied to the whole oral cavity, there is depression of the pulse. Spices, with the exception of onion and garlic, are stimulating when applied to the tongue, and mucosa of the cheek and palate; onion and garlic are stimulating when applied to the tongue, depressive when applied to the cheek and palate and stimulating when applied to the whole oral cavity. All foods are more stimulating when eaten raw than when cooked. Cold and heat are depressive and moderate heat has the most stimulating effect. The mixture of several foods has a stimulating, cumulative effect. The act of chewing causes depression of the pulse; the effect of stimu-

lating substances is diminished, and that of depressive substances is increased thereby. Porcelain and glass receptacles are stimulating, also those of silver, gold, iron and nickel; lead, copper and German silver are depressive, but wood is indifferent. The entrance of the substance into the stomach causes similar changes in the pulse as their application to the tongue or mouth respectively, but the change in the pulse is greater and of short duration. The diminution of the pulse is associated with lowered blood pressure.

Treatment of Pyelitis by Intravenous Therapy. W. C. K. Berlin (*Medical Record*, April 8, 1922) has had good results from intravenous injections in pyelitis of hexamethylenamine in twenty grain doses in twenty c. c. capsules alternating with capsules containing a twenty c. c. solution of sodium iodide twenty-eight grains, creosote and guaiacol of each one eighth grain in slightly alkaline normal solution. Berlin believes that the anatomical and postural environments of the kidneys are the chief factors predisposing to pyelonephritis. Intestinal stasis, autointoxication and autoinfections from different foci are no doubt the immediate cause of pyelitis. In metastasis the blood stream is the means of transmitting the infection to the pelves of the kidneys. Therefore, intravenous injections of selected solutions may attack the bacteria either *in situ* or in transit through the blood stream.

A New Method of Demonstrating Rail Fibres.—Rudolf Maresch (*Wiener klinische Wochenschrift*, March 23, 1922) describes a technic for the demonstration of the rail fibres and delicate collagen framework in normal and pathological tissues with a solution of methyl green picrate, prepared by mixing equal parts of a concentrated methyl alcoholic solution of picric acid and a like solution of methyl green. This mixture is poured into an air tight cylindrical glass. The sections are dried in the usual way on glass slides, freed of paraffin, treated with absolute alcohol for a short time and then placed into the methyl green picrate for ten minutes, or even longer. It is advisable first to wash off the absolute alcohol with a few drops of methyl alcohol. The stained specimen is then quickly rinsed with water and counterstained with a few drops of a five tenths per cent. to one per cent. (at the most) watery solution of acid fuchsin, which is removed after five to ten seconds with water, or preferably with blotting paper. The water is removed by adding a few drops of absolute alcohol, which produces a pale grayish violet tint. The section is then cleared in xylol and mounted in Canada balsam. The nuclei show a violet color, the plasma is more or less pale red, acidophile granules are yellow, basophile granules are intensely dark red and the erythrocytes stain green. The coarser collagen fibrillar bundles appear violet red and the rail fibres are blazing light red, whereas the glia fibres show only a pale rose red tint. This stain is adapted to the staining of lymph nodes, spleen, bone marrow, skin and various granulation tissues, as well as neoplasms; it is especially adapted to the staining of the basophile granular cells in the anterior lobe of the pituitary body, which it distinctly differentiates from the sulphur yellow acidophile granules and pale red ungranulated cells by a deep dark red tint.

Antipneumococcic Serum in Pneumonia and Bronchopneumonia of the Aged.—Weill-Hallé, Weissmann-Netter, and Aris (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, February 9, 1922) report eight cases of pneumonia in persons fifty-eight years of age or over treated with a polyvalent pneumonia serum prepared at the Institut Pasteur. Seven of the eight patients were between seventy-three and eighty-eight years of age. Six patients recovered and two died. One of the deaths was due to senile gangrene of the leg which followed apparent recovery from pneumonia. The other death was due to bronchopneumonic involvement in the opposite lung, for which no serum treatment was given. The amount of serum injected in this series of cases was but twenty mils a day, given daily or on alternate days, according to the temperature and general condition of the patient. Stress is laid on the tolerance of these aged subjects for serum treatment. Only one patient showed a brief temperature rise with slight urticaria. Marked improvement in the general symptoms followed the use of the serum, although the local physical signs ran the same course as in pneumonia not thus treated. Yet some patients were enabled to get out of bed on the seventh day after the onset of lobar pneumonia. One of the patients who recovered was diabetic and alcoholic.

X Ray Treatment of the Hematopoietic Organs in Pulmonary Tuberculosis.—Trémolières and Colombier (*Bulletin de l'Académie de médecine*, February 14, 1922) reports twenty-three cases of advanced lung tuberculosis treated with good results by x ray exposures of the spleen and long bones. The focus over the spleen was at thirty-seven centimetres, with a current of 78,000 effective volts and two milliampères. One to three millimetres of aluminum was used and the dosage nine tenths of an H unit. Weekly sittings were given. Notable improvement was always seen by the seventh or eighth sitting. The treatment was never continued beyond the fifteenth or sixteenth sitting less splenic activity be exhausted. The temperature curve showed improvement even after the earlier sittings, in most instances. Sweats also rapidly ceased. Cough increased up to the fifth or sixth sitting, then subsided rather rapidly. All patients gained weight more or less rapidly. The number of tubercle bacilli generally increased up to the fifth or sixth sitting, then showed a very distinct reduction, with lessened expectoration. About the seventh or eighth sitting, in the majority of cases, morphological changes in the bacilli were seen, the bacilli becoming longer, forming chains, becoming curved, and showing numerous granulations—all regressive changes in the microorganisms. In two cases the bacilli disappeared entirely at the twelfth sitting. The leucocytes in the blood showed at first a reduction, then a leucocytosis. In nearly all instances there was a slight set back in the patient's condition at about the seventh sitting; but subsequently improvement soon set in again, and was accentuated by later treatments. In patients completely at rest the temporary set back was much less marked than in others. On the whole, the results obtained are deemed very encouraging, although the duration of the beneficial effects is as yet not definitely known.

Treatment of Typhus.—A. M. Caccini (*Military Surgeon*, April, 1922) gives the following treatment for war typhus: As we have no specific means of medication as yet, we will have to be limited to symptomatic treatment and cure. We may here mention the utter failure of the use of quinine as a specific. Cardiac stimulants must be used, giving the preference to strychnine and caffeine. Constipation must be controlled within the first few days. Contrary to general belief and practice, the use of antipyretics is a bad one; instead, cold pack and cold baths are indicated. General cleanliness of the skin to a certain extent and of the mucous membranes in particular is the very best of practices in order to diminish the probability of the formation of abscesses, bed sores and gangrenes. Feeding should be attended to most scrupulously and should be most substantial.

Muscle Angioma of the Deep Musculature of the Neck (Rhomboideus Minor Muscle).—Hans Finsterer (*Wiener klinische Wochenschrift*, March 23, 1922) reports this rare condition in a girl nineteen years old, who for six months showed a gradually increasing tumor, associated with increasingly severe pains, especially at night when lying down. Various diagnoses were made, but aspiration of the mass revealed the presence of venous blood, establishing thereby the diagnosis of hemangioma. The tumor, as large as a fist and partially compressible, was extripated. The histological examination confirmed the diagnosis. These tumors are usually congenital in origin. The fact that the tumor enlarges when the patient lies down and becomes smaller on standing up with simultaneous relief from tension pain, associated with the objective compressibility of the mass and increase of the circumference of the neck, should suggest the possibility of the presence of this condition. It must be differentiated from cold abscess and lipoma, particularly in regard to therapy: early operation is especially indicated, as these angiomas have a tendency to displace the neighboring structures and even to perforate bones.

Practical Significance of Principles of Habitus and Renaissance of Humoral Pathology as a Therapeutic Consequence of Constitutional Teachings.—B. Aschner (*Wiener klinische Wochenschrift*, February 2, 1922) discusses the moot question of the interrelationship of habitus and constitution, as regards the significance of pigment contents, temperament, internal secretions, blood mixture, the question of hypotonia and hypertonia, especially in the field of gynecology, and emphasizes the basic difference between the sexes. Females show a predisposition to asthenia, enteroptosis and a similarity to the childish organism in a greater irritability of the nervous system and a more rapid and more abundant blood formation, and also a greater tendency to neoplasm formation. The significance of constitution is seen in the humoral general diseases in contrast to the exogenic factors, and therapy must be governed accordingly, as, for example, in menstrual, climacteric and postclimacteric disorders and other female diseases. In regard to therapeutics there is an increased significance in the treatments with aperients and other derivative remedies, but especially with venesection, the extensive application of which the author warmly recommends.

Early Weight Bearing.—P. D. Wilson (*Journal of Bone and Joint Surgery*, April, 1922) in a consideration of early weight bearing in the treatment of amputations of the lower limbs summarizes as follows: 1. Experience gained during the war in the treatment of patients with amputations of the lower limb has shown that it is possible to get such patients out of bed without crutches and actively bearing weight in peg legs or simple forms of artificial limbs at a period two to three weeks after amputation. 2 Early weight bearing is of great advantage to the patient because it promotes healing of the wound by improving the circulation, and in cases with terminal localized osteomyelitis favors the separation and spontaneous discharge of sequestra. It hastens stump shrinkage and prevents muscle atrophy and the development of joint contractures. It favorably influences the patient's morale. It greatly shortens the period until the permanent artificial limb can be fitted and reduces the need of frequent alterations in the socket, and thereby much expense to the patient. Provisional apparatus to secure early weight bearing may be made to best advantage of simple materials, in the use of which the surgeon is already skilled. With understanding of the advantages of early weight bearing in the treatment of amputations of the lower limb, and of the little difficulty involved in its application, the method should be universally applied.

Iodine Reaction in the Diagnosis of Typhoid Fever.—M. Pivano (*Minerva Medica*, Turin, March 15, 1922) remarks that Petzetakis in 1917 described a new reaction which was of value in the diagnosis of typhoid fever and in the prognosis of advanced tuberculosis. It consists in putting fifteen to twenty c. c. of urine in a test tube and overlaying it with a few drops of a five per cent. alcoholic solution of iodine. The reaction is positive when there is produced in the upper stratum of urine a change in color to a yellowish gold of varying intensity. The presence of albumin, sugar, or other pathological elements, does not disturb the reaction. The test further antedates the appearance of the Widal by several days thus aiding in the early diagnosis of suspected cases. In one case of Pivano's the iodine reaction was positive on the sixth or seventh day, while the Widal was persistently negative; a positive blood culture was obtained on the twentieth day and autopsy verified the diagnosis of typhoid.

Ultraviolet Ray in Dentistry.—L. B. Lipman (*American Journal of Electrotherapeutics and Radiology*, October, 1921) concludes: 1. That the quartz light has a therapeutic value in the treatment of certain oral conditions. 2. That it is destructive to Vincent's bacteria. 3. That its stimulating qualities are especially valuable, in the treatment of morbid gum conditions. 4. That the results obtained are more rapid under treatment with the light than with other chemical agents. The author does not mean to imply that the quartz light is a cureall. There are cases of pyorrhea, he says, which are especially hopeless and in these cases the ultraviolet ray is just as ineffectual as other treatment. But, observation has shown that those cases which have not yet reached the hopeless stage will respond more rapidly to light treatment than to other means.

Diagnosis and Treatment of Hydrocephalus.—Walter E. Dandy (*Surgery, Gynecology and Obstetrics*, February, 1921) states that blocking of the foramina of Luschka and Magendie invariably produces hydrocephalus. Patency of one of the three foramina prevents the development of hydrocephalus, provided the subarachnoid space is normal. A group of cases is presented with occlusion of these foramina and with a hydrocephalus resulting therefrom. Undoubtedly, the disease, occurring in adult life, follows an inflammatory process which may or may not have been clinically evident. Probably failure of the foramina to develop accounts for the hydrocephalus in many cases which are recognized soon after birth; in other infants an intrauterine or postnatal inflammation is the cause. Although the general results of the occlusion are the same in every case, there are marked local anatomical differences due to the extent of the inflammatory process and the time of its development. There are no clinical features which permit one to make an absolute diagnosis of occlusion of the foramina of Magendie and Luschka. In every instance, both in adults and infants, the diagnosis of hydrocephalus is possible; the exact site and the character of the obstruction causing the hydrocephalus can be determined by ventriculography and by the phenolsulphonephthalein test.

Lactation and Menstruation.—St. Engel (*Monatsschrift für Kinderheilkunde*, January, 1922) reviews theories concerning the stimulation of the mammary glands by ovary, corpus luteum, and placenta. A similar effect has been ascribed to the tissues of the fetus and even to an internal secretion produced by glands forming in the wall of the gravid uterus. On the other hand, clinical experience demonstrates that the breasts may affect the primary sexual organs. This is evidenced by stimulation of uterine contraction provoked by suckling; by lactation atrophy of the uterus and by suppression of menstruation during lactation. In the past return of the menstrual flow during lactation was generally considered to be an unfavorable event. Often it was even taken as a signal for weaning. However, it is now accepted that the onset of menstruation is not at all exceptional and does not imply any detriment for mother or child. Finkelstein in his recent textbook states that one half of all mothers menstruate before weaning and one third even within the first three months. Experience has shown that actively functioning breasts are not obviously affected by menstruation, nor even by a supervening conception. On the other hand, the author has been able to show in clinical studies that weakly secreting breasts show a definite connection with menstruation. It is a fact that the period returns within the first few months in women who do not produce more than six hundred c. c. of milk; and the less the amount of milk secreted the sooner menstruation returns. Naturally it follows that menstruation is not at all suppressed in cases where the mammary activity is markedly deficient.

The author suggests a formula for determining the date at which the return of menstruation may be expected. The result of subtracting two from the number of one tenth of a litre of milk secreted during the day represents the number of months. Thus, if 0.6 litres of milk are produced, menstruation will reappear 6—2=4 months after delivery. The interesting question arises how the menstrual function is influenced by the quantity of milk produced. Curves recording milk secretion show that the maximum output was only maintained for a short period. A gradual decline then occurred and about four weeks later menstruation supervened. Cumulative evidence of this nature permits the conclusion that the return of menstruation is the consequence of a functional decline of the mammary glands. The reverse suggestion that secretion ceases as a result of menstruation is incorrect. The curve of milk production shows that appearance of the menstrual flow has no effect on the quantity of milk secreted.

The author points out that the mechanism by which the breasts exert their influence on the primary sexual organs may be in the nature of an internal secretion.

Fracture of First Lumbar.—R. V. Gorsch (*Annals of Surgery*, March, 1921) summarizes as follows: 1. Bismuth mixtures can be injected into the bronchi and lungs of a living patient without danger. 2. The injection of an opaque substance into the lung of the living patient will open an enormous field of usefulness in the study of cough, the expulsion of substances from the lung, and lung drainage. It will also aid in localizing bronchial strictures in the same manner as in the esophagus. Furthermore, it will be of the greatest aid to the thoracic surgeon by mapping out the abscess cavity in the respective lobe of the lung. A definite lung abscess cavity is seldom seen bronchoscopically. Pus is usually seen coming from a branch bronchus, although the abscess may be well around the corner, and not in that portion of the lung from which the pus is oozing. An injection of bismuth mixture or some other opaque mixture will clear up this error. 4. Bismuth when it enters the abscess cavity is recognized by its metallic lustre, whereas, when it is in the lobular lung structure, it is discerned as a dull, opaque area. Pus diffuses and soaks the lobular structure in a manner similar to bismuth; this often makes the involved area appear many times larger than it really is. 5. The bismuth mixtures injected in these patients was eight c. c. of bismuth subcarbonate in pure olive oil one to two. The mixture is rendered sterile by boiling before injection. 6. The injection should be made slowly and not with a "squirt" or else the röntgenographic observations may be spoiled by bismuth soaking the lung structure surrounding the diseased area. 7. It seems from these preliminary studies that cough and action of cilia are not the only means of expelling secretions. 8. While bismuth mixtures were originally injected for the purpose of lung mapping in cases of lung abscess cavities, they seem to have been of therapeutic benefit to the five patients upon whom they were tried. So far the procedure has done no harm. 9. While the fluoroscopic examination is important, stereoröntgenographic examination is the best means of localizing the cavitations. 10. Experience has shown that the röntgen examination should be made almost immediately after the removal of the bronchoscope, otherwise the patient, in a fit of coughing, will remove much of the bismuth from the involved lung.

Proceedings of Societies

MEDICAL SOCIETY OF THE STATE OF NEW YORK.

One Hundred and Sixteenth Annual Meeting
Held in Albany, April 18, 19 and 20, 1922.

The President, Dr. JAMES F. ROONEY, of Albany, in the Chair.

President's Address.—Dr. JAMES F. ROONEY, of Albany, stated that it must be apparent, even to the most indifferent, that there was a ferment of unrest which had leavened the body politic these last twenty years and that the human race the world over was sick. The profession of medicine as a part of the body politic, that part which more than any other had been brought into contact with the miseries of humanity, need now more than ever to summon all its coolness and clear reasoning, its altruism and its compassion, to do its utmost in the work of healing the wounds of the world.

Oration on Surgery: The Art of Surgery.—Dr. JOHN B. DEAVER, of Philadelphia, asserted that the art of surgery was as old as history itself. Hippocrates did not sanction the too prevalent attitude of modern times that the surgeon was a mere mechanic but rightly considered him a healer skilled in the use of instruments. With the discovery of ether anesthesia by Crawford W. Long, in 1842, the era of modern surgery began. In the course of the next twenty-five years the work of Lister and Esmarch had combined to develop an art which had been confined to emergency surgical procedures into one which had been robbed of its terrors, and which had been the means of diminishing and even abolishing much of the suffering of mankind.

An indispensable factor in the development of the surgery of our day was, of course, animal experimentation. It had probably done more than anything else to widen the boundaries of our knowledge, by substituting for vague theories more exact knowledge and refined methods of procedure. Our entire method of study and investigation had its base in experimental work. It was incomprehensible to him, Dr. Deaver declared, how any rightminded individual could spend time, effort and money in furthering propaganda against this indispensable adjunct to the progress of medicine. The spirit of investigation should be developed instead of being hindered. It should be subsidized instead of being taxed.

Progress in surgery was not dependent upon clinical and animal experimentation alone; equally essential for surgical diagnosis and treatment were the researches in the field of bacteriology, chemistry, physics and physiochemistry. However, with these aids at our disposal we were in danger of losing the advantage of the highly trained senses which our ancestors developed and which to a surprising degree enabled them to detect obscure signs.

One of the principles of surgery which modern methods had developed to a remarkable degree was that of the least amount of tissue injury with the conservation of the maximal function. A proper understanding of the chemical changes that took place during the process of metabolism was most essential to bodily functions in health and disease. We must ever remember that with promise for the future closer contact with the anatomist, the physiologist, the pathologist, the pharmacologist and the biochemist was essential. With the constantly deeper penetration of the science into the art of surgery, operative mortality had been reduced to a minimum in a large class of cases. In cancer of the breast it was almost negligible, less than one per cent. In uncomplicated chronic appendectomy it was now considered practically nil. For other abdominal operations the death rate was constantly decreasing.

This was all the more interesting and gratifying in view of the fact that most of the abdominal operations commonly practised today were comparatively late arrivals in the surgical arena. Not a little of the satisfactory reduction of operative mortality was due to improvement in methods of administering general anesthetics. Local anesthetics had come to occupy an important place in operative surgery, particularly in certain types of cases in which a general anesthetic would be attended with too great risk. The method of anociassociation as developed by Crile was proving particularly useful in the socalled bad risk patients, such as the cases of exophthalmic goitre.

Another factor in the improvement of operative mortality was rapidity of operation, not the record breaking surgical gymnastics that appealed to the gallery, but the quickest maneuvers and minimum of manipulation consistent with exact and careful work. Simplicity was also an important item in the surgery of today, and in every act it was the virtue that reigned supreme. The personal equation of the operator—or rather of the surgeon, for there is a vast difference between the two—was a vital factor in successful surgery today. Postoperative methods had undergone a change in our day. An erroneous impression that was rapidly being corrected was that functional rest was an essential factor in postoperative treatment. Today the wound was allowed to heal with the minimum of interference and the maximum of rest. But with regard to function their efforts took the opposite course. In the treatment of sprains, dislocations and fractures, instead of prolonging bandaging and rest, they encouraged, whenever possible, early activity of the muscles, and passive and active movement of operated joints, so that by the time union of the bone had taken place the muscles and joints were in a more or less normal condition. Free respiration was essential not only after all operations on the thoracic region, but after abdominal operations as well. To avoid postoperative adhesions and to obtain the necessary freedom of respiration, they made their patients assume a semisitting position, in or out of bed, as early as the second day after operation.

SECTION IN MEDICINE.

Treatment of Anthrax by Local and General Administration of Antianthrax Serum.—Dr. Joseph C. Regan, of Brooklyn, affirmed that the value, both prophylactic and curative in animals, and therapeutic in man, of antianthrax serum must now be regarded as established by statistics. The method which seemed most successful was that of administering ten c. c. of antianthrax serum by local infiltration, every eight hours, and forty c. c. intravenously, every four hours. Anthrax serum fulfilled best the points requisite for an ideal method of treatment of anthrax. It was applicable to all forms and locations of the disease. It yielded, on an average, in a large series of cases, by far the lowest mortality rate. It was a specific measure. It was a safeguard against generalization of the local disease, if used in time. It offered the least amount of scarring and deformity. It caused a minimum of pain. It demanded, on an average, a relative short absence from employment. It was a reliable method, and might be expected to cure all cases, if administered before septicemia had set in.

Sequelæ of Encephalitis Lethargica and Their Treatment.—Dr. Lewellys F. Barker, of Baltimore, stated that statistics based upon careful followup work had already indicated that complete recovery from encephalitic lethargica was the exception rather than the rule. Perhaps seventy-five per cent. of patients exhibited residual phenomena that were more or less serious. Hence a guarded prognosis should be given. A great variety of postencephalic syndromes had come to observation and description. In motor domains they included hypokinetic phenomena (pareses, paralyses) and hyperkinetic phenomena (myoclonic, choreic, athetosic, convulsive). Extrapyramidal motor disturbance also had been especially prevalent. In sensory domains anesthetic, hyperesthetic and paresthetic syndromes were described. Disturbances of coordination (ataxia, asynergy) had not been uncommon. Further, many autonomic disturbances (vasomotor, secretory, trophic, respiratory, circulatory, nutritional) had been described. Perhaps most common of all sequels had been certain postencephalic disturbances of the psyche in the form of character, cognative, affective or conative disorders. A Parkinsonian syndrome was a frequent postencephalitic sequel, doubtless due to the predilection of the virus for the corpus striatum, especially the globus pellidus. It was surprising, Dr. Barker said, how frequently autonomic symptoms and signs were demonstrable over long periods after recovery from epidemic encephalitis. Particularly common were certain pupillary and ciliary disturbances. Sialorrhea with constant spitting was frequently met with; xerostomia was less common. Among the nutritional disturbances reported, rapidly developing obesity seemed to be the most common. The mental disturbances in acute neuraxitis were those of the acute organic types of mental reaction of the character described by psychiatrists as toxic infectious psychoses. A considerable proportion of children were rendered permanently deficient. Even in adults there might be loss of memory and judgment. A behavior characterized by motor agitation had been occasionally observed. Many who had studied the psychotic and psychoneurotic manifestations following epidemic encephalitis had been impressed with their aping of various minor and major psychoses. This aping of processes hitherto regarded as functional by the sequels of a disease in which there were known to be definite and extensive diffuse and focal organ changes within the brain was suggestive. Many had through this been confirmed in their opinion that the distinction between organic and functional processes was merely one of degree. It would seem probable that every gradation might exist between gross structural alterations that were visible to the naked eye and finer and subtler changes that could not be recognized as yet, even with microscopic examination, but that might some day be demonstrable in chemical composition.

Results of Active Immunization with Diphtheria Toxin Antitoxin in the Schools in New York City.—Dr. Abraham Zingher stated that the results obtained during the past eight years by these methods had been very favorable, having shown that eighty-five to one hundred per cent. of nonimmune children became immune to diphtheria after the first series of toxin antitoxin injections. In the schools they had met with great variations in the results of immunizing injections with the same strength and preparation of toxin antitoxin. In retesting children who had had one series of injections the discrepancies varied all the way from seventy-five to eighty per cent. of successful immunizations in some schools to twenty-five to thirty per cent. in other schools. It was found that the percentage of those becoming immune after receiving one series of inejctions of toxin antitoxin was in inverse proportion to the percentage of positive reactions following the original Schick test. Where the number of positive Schick tests was high the number of children becoming immune after one series of injections was low. The reverse was likewise true. It was found that the children in the poorer sections of the city gave fewer positive reactions to the Schick test and responded to the toxin antitoxin injections with a higher percentage of immunes than the children in the better sections of the city among the well to do. They had obtained as high as sixty to seventy per cent. of positive Schick reactions with the original test in schools located in certain sections of the city among the better classes, while in schools in crowded sections of the city only fifteen to twenty per cent. gave positive Schick tests. The explanation was that the children in the poorer sections were often exposed to mild doses of diphtheria organisms which brought about a certain degree of natural immunity. Among the children of the better classes this exposure was not present, because they were segregated and isolated, and they therefore remained susceptible. It was evident that the toxin antitoxin brought about a better response in the children in whom antibodies had been stimulated by previous exposure. Even if they gave a positive Schick test they responded readily to the immunizing doses of toxin antitoxin. Thus far over one hundred thousand children had been tested and they expected soon to finish testing the children in every school in Manhattan and the Bronx. Among all these tests and

infections he had not seen one case of infection. In order to bring about an immune child population it was necessary to begin early and to immunize all children from one to five years of age, inasmuch as eighty-five per cent. of the cases of diphtheria occurred among this group. The injection of toxin antitoxin in the newborn brought about very little immunity; the injections were effective, however, after the child reached the age of six months.

SYMPOSIUM ON FUNCTIONAL TESTS AND THEIR SIGNIFICANCE.

Circulatory.—Dr. William W. Herrick, of New York, recalled the fact that tried in the fire of experience in sifting out the unfit among the United States recruits in the recent war, the exercise test was not found wanting. Its simplicity and lack of requirement of apparatus made it most desirable. The pulse rate was counted after the subject had been quietly seated for a few minutes. Then a measured amount of work was performed, depending upon the safe capacity of the individual. The work performed should make a genuine demand upon the subject's capability. The pulse rate was counted immediately after exercise and again after two minutes rest. In the absence of disease of the lungs or gross pathology elsewhere or of fatigue the pulse rate in the young individual in good physical trim after a hundred hops should not be accelerated more than twenty beats a minute, and should, within two minutes after stopping exercise, be within five or ten beats of the previous resting rate. Dyspnea should not be marked. Modified to meet the individual needs of the patient or physician this test was the most practical of all for the practitioner. The ideal test for circulatory function should take account of all possible factors. It should include the resting pulse rate, the standing pulse rate, the rate after exercise and after a change of posture; such respiratory factors as the vital capacity, the minute volume of pulmonary ventilation, the pressure gradient of carbon dioxide in the blood entering and leaving the lungs, the basal metabolism rate, the electrocardiogram; all this in addition to the time tested physical examination and history. With all this data complete we should be nearer but not at the goal. Should a higher degree of precision be desired, Schneider's system is to be recommended. The more factors that are taken into account the better; always, however, one strove for the unattainable, a thoroughly reliable test of circulatory efficiency.

Renal.—Dr. John R. Williams, of Rochester, stated that the most valuable methods of determining renal function were those developed largely by Mosenthal of determining the specific gravity and fixation of the specific gravity, and those of Myer, Fine and Chase for investigating the blood chemistry. The phenolphthalein test had a limited degree of usefulness, but none of these tests by itself was sufficient. Judgment of the patency of the kidney must rest on a study of the patient himself, modified by the renal findings. A single test of renal function was of limited value. The phenolphthalein test, Dr. Williams said he no longer used, owing to its wide limit of error. A high blood urea was of very serious significance. Patients with a blood urea of two hundred mg. or approaching that point did not live long. Blood creatinin as high as six mg. was of very serious significance. With a blood creatinin of between three and six mg. a patient might live about a year. One test alone, whether made once or several times, was not nearly as valuable as a combination of tests. It was advisable to make all the functional renal tests and then follow those which gave the most significant leads. A combined marked fixation of specific gravity with hypertension was a serious portent. The individual with hypertension but without marked fixation of specific gravity could live along for years. An individual with low urea and marked fixation of specific gravity might go along quite a while. A marked fixation of specific gravity and high blood urea gave a very bad prognosis. Even with severe hypertension, if the urea remained low and the creatinin remained low the patients did well, if at the same time there was a normal specific gravity, but when the fixation of specific gravity, or urea or creatinin went up the outlook became serious. The reason for calling attention to these conditions was because some of them could be averted and others could be alleviated. Patients with hypertension and albumin in the urine had a serious outlook. A fact to be emphasized was that if an individual manifested kidney disease in such a manner that destruction or degeneration took place slowly so that the unaffected cells might compensate, the patient might go along for years. If the process came on rapidly and the opportunity for developing compensation was not very good serious phenomena might be precipitated. The best way to make functional tests was under the conditions in which the patient lived at home as suggested by Mosenthal. While urea and creatinin were of great importance, uric acid was not so important. Repeated functional tests together with the physical and blood pressure findings would enable one to form a judgment not only in regard to prognosis but also as a guide to the best method of treatment.

Gastrointestinal.—Dr. Abraham A. Aaron, of Buffalo, reviewed the findings in a series of eighty-five cases, normal and pathological, tested by fractional and single meals. In summarizing he stated that gastric subacidity was characterized by a low total and a free acid, rapidly emptying stomach, rapid disappearance of starch from the contents, and small amount of contents secured by aspiration. Achylia gastrica was characterized by a total acidity rarely over ten, absence of free hydrochloric acid, absence of pepsin, rapid disappearance of starch, and small amount secured by aspiration. Hyperacidity was characterized by a high acid value, large amounts, food retention, due to associated pylorospasm and separation of the contents into three layers. Pyloric obstruction due to ulcer, cicatricial tissue or extragastric pressure was characterized by high acid values, large amounts of contents, food retention, and three layer phenomenon. Carcinoma, nonobstructive, was usually characterized by subacidity, small amount, rapid starch disappearance and rapid emptying stomach. Carcinoma of the obstructive type was characterized usually by subacidity of achlorhydria, large amount, food reten-

tion, and three layer phenomenon. At the present time the fractional analysis had considerable distinctive value, but the single test meal was more easily and rapidly performed, rendering valuable diagnostic facts, for which reason, it must not be too hastily set aside or belittled. The fractional test was of outstanding value in determining a true achylia or subacid condition, and the actual emptying time of the viscus. From the findings in the eighty-five cases tested by fractional and single meals it might be stated that the single test meal was still of considerable value diagnostically and more easily performed than the fractional. There was a group of cases in which the fractional test was annoying, causing retching, duodenal regurgitation and salivation.

Transfusion of Blood of Immunized Donors in Bacteriemia.—Dr. Lester J. Unger, of New York, stated that the transfusion of unmodified blood was of far greater value than blood modified by the addition of sodium citrate. Sodium citrate, even in low percentages, affected the red blood cells, rendering them more fragile; diminished the available quantity of complement; reduced almost to nothing the function of opsonins, and practically destroyed the phagocytic power of white blood cells. Since the complement and phagocytic power were of prime importance in the protective action against pathogenic organisms, unmodified blood from a donor with high phagocytic index should be employed when attempting to combat local or general infections by means of transfusion. Dr. Unger described the work he had been doing in the endeavor to enhance the value of the donor's blood by producing immunity to the organisms causing bacteriemia in the patient. An autogenous vaccine was prepared from the patient's blood and the donor was treated with this vaccine, starting with one hundred million killed bacteria and giving daily injections of the vaccines in increasing doses up to one hundred to one hundred and fifty billion. Immunization was usually produced by the end of nine or ten days. Agglutination tests should be carried out to establish the fact that the donor had developed immune bodies before the transfusion was given. If a serious case required immediate transfusion whole blood should be employed and following this the donor should be immunized. A comparison of results in cases suffering from bacteriemia when treated with unmodified blood and when treated with the blood of immunized donors was decidedly in favor of the latter method.

Possible Clinical Significance of the Thyroid Suprarenal Cortex Interrelationship.—Dr. David Marine and Dr. Emil J. Baumann, of New York, stated that the clinical manifestations of very acute cases of exophthalmic goitre were almost identical with the clinical manifestations produced in rabbits by sufficient suppression of the cortical function. This made possible a new conception of exophthalmic goitre. If the cortex could accelerate and inhibit thyroid activity, one must suppose that it was interrelated with many other gland activities in a similar manner, and there was abundant evidence that this was the case. During the last three years, in collaboration with Dr. Shapiro, the writers had been feeding fresh and dried suprarenal cortex to selected typical cases of exophthalmic goitre at Montefiore Hospital. Very encouraging results had been obtained in a small group fed with fresh cortex, while little or no improvement had been noted from the administration of the dried commercial preparations or those prepared by themselves. This therapeutic measure was one which deserved more extensive trial and study, and if found beneficial, attempts would be made to isolate, or, at least, concentrate the active substance.

Acute Anaphylactic Reactions Following the Intravenous Injection of Arsphenamine.—Dr. Burton P. Thom, of New York, asserted that the hypersensitiveness to organic arsenic in some patients and its absence in others could only be explained on the ground of idiosyncrasy. The possibility of shock following the intravenous injection of arsphenamine or any of its congeners, while of rare occurrence, yet because of its sometimes fatal outcome and the fact that its occurrence was always unexpected and could not be presaged, must always be considered. We knew that arsphenamine in itself possessed hemolytic power and that this hemolytic power was enhanced by using plain water or a saline solution that was hypotonic, or by improper use of the neutralizing agent, sodium hydroxide. If arsphenamine was to be given the solution should always be isotonic. The water from which this isotonic solution was prepared should be doubly distilled and fresh; it should not be more than four hours old when used. The sodium hydroxide solution should be of known strength and also freshly prepared. A sodium hydroxide solution that had been kept indefinitely should not be used. Neutralization should be exact—not guessed at. In preparing the solution it should not be too vigorously shaken for too long a time, since its toxicity was much increased thereby. A concentrated solution of arsphenamine should never be given. A dose of six tenths gm. arsphenamine should never be given in less than one hundred and eighty c. c. of water. Personally, the writer preferred neoarsphenamine to arsphenamine. It was simpler to prepare and thus the chances of error were reduced to an irreducible minimum. It could be given in concentrated solution. He preferred to give nine tenths gm. in thirty c. c. of water—the dilution of Thiberge.

More Common Forms of Nervous Disease.—Dr. Edward Livingston Hunt, of New York, stated that epidemic encephalitis, multiple sclerosis and syphilis of the central nervous system should be considered the three principal nervous diseases. Epidemic encephalitis attacked most frequently the young and strong, affecting the small round cells about the smaller bloodvessels and the lymph and nerve cells and destroyed the nerve cells. As a result the symptoms were many and variable depending upon the locality in which the nerve cells were affected. There were four cardinal symptoms, namely, ocular paralyses, lethargy, elevation of temperature and changes in the general state. There might be, in addition, rigidity, depression and tremor. Among the aftereffects one might find the Parkinsonian syndrome like that seen in paralysis agitans. In fact, this syndrome as seen in paralysis agitans and following epidemic encephalitis was identical.

From this it seemed fair to assume that the Parkinsonian syndrome should not be regarded as an entity but merely as a symptom resulting either from a toxic cause or from bacterial invasion. If this syndrome followed epidemic encephalitis, might it not follow other acute infections which were known to affect the central nervous system? The condition was sometimes greatly relieved by the application of the actual cautery. Chorea was a word used to designate involvement of the central nervous system and was suggestive of many conditions. The Sydenham type was most frequently due to toxic conditions or infection. Any cause of reflex irritation must be sought for and removed, errors of diet must be corrected, the patient must be isolated and complete rest enforced. Arsenic administered intravenously was valuable in a few cases. The bromides had the disadvantage that they tended to depress the patient.

Coming to the subject of neurosyphilis, Dr. Hunt described the different types of affections of the central nervous system due to syphilitic infection. In making a diagnosis of a neurological condition syphilis should be placed at the head, and one should never reach a definite conclusion until syphilis had been excluded. It should also be borne in mind that syphilis was a constitutional disease and that the nervous system was affected very early. Many believed that the spinal fluid was involved a few weeks after infection. The treatment of neurosyphilis should be intravenous or intraspinous. When the intraspinous treatment could be avoided he thought it best to do so. One should administer salvarsan on one day of the week and mercury on another day. Silver salvarsan had been tried but Dr. Hunt could not say that the results were better than from the arsenical preparation. He felt that in most instances in which salvarsan was not tolerated it was due to the fact that the dose was too large or there was a mistake in the technic. It was well to remember that the reaction to the Wassermann test might be different at different times. As patients with neurosyphilis advanced in life Nature seemed to set up an immunity against the syphilic virus.

Open Air School for Children.—Dr. Clarence A. Greenleaf, of Olean, expressed the belief that the public servants (school medical inspectors, health officers, etc.) were not fulfilling their duty unless they utilized every possible service of assistance to accomplish results. Public servants of the classes referred to above should get what assistance they could from the American Red Cross, the antituberculosis societies and similar agencies, and should stimulate interest among all classes in their efforts. In Olean, a city of over 21,000 people with the usual charitable institutions but no open air nutritional work, an active and well financed antituberculosis society was willing to build, equip and maintain an open air school. The new building included a complete kitchenette, and since this school was opened last September the pubils had been given a morning and afternoon diet (milk with crackers or bread and butter) and a well balanced noon meal. The statistics presented furnished abundant evidence of the value of this plan in combatting undernutrition among school children.

Heart Disease and Pregnancy.—Dr. Harold E. B. Pardee, of New York, recalled that we had been told that mitral stenosis was a most dangerous lesion, and that the presence of aortic regurgitation was of very serious moment, yet one often saw patients with either or both of these lesions who had gone through one or more pregnancies without any untoward event. It was also true that some patients with these lesions who had more or less marked symptoms of cardiac insufficiency during their pregnancy manifested edema of the lungs during labor, and many of these died. The problem was fundamentally difficult. The only way to find a solution of the problem was to see a considerable number of women with heart disease either before they became pregnant or in the early months, and to follow them through pregnancy and labor to see how they withstood the strain. It had been possible to do this at the Lying-in Hospital. From this experience it seemed that the sole reason for the bed repute of mitral stenosis lay in its frequency. At the Lying-In Hospital it was found to be twice as frequent as aortic regurgitation, and so one would find twice as many mitral cases causing trouble as he did aortic cases if the two were of equal severity.

They did not find this proportion among their seriously sick patients, there being about an equal number with each of these lesions. The only guide from the heart's pathology which they had been able to deduce from their experience was a belief in the relative harmlessness of uncomplicated mitral regurgitation, whether with a slight or a greater degree of enlargement of the heart. All their patients who had this condition were well compensated throughout pregnancy and labor. If, however, one of these patients should fall in Group III or in Group IV of the classification adopted by the Association of Cardiac Clinics of New York—a coincidence which they had not encountered—he should not feel that they were any safer than other patients of those groups. By combining the patient's symptoms after her ordinary exertions and her reaction to the exercise tests they had been able to place all patients in one of four categories which followed the general principles of the classification of the New York Association of Cardiac Clinics. They had found this grouping very useful in prognosis.

It had also been a help in the management of pregnancy to know that Group III or Group IV women must be carefully watched, because only about half of them would go through labor without a dangerous degree of cardiac overstrain. Women of these two groups should be allowed to undertake pregnancy only when there was some special reason for having a child or when they were ready to keep themselves under the constant observation of a physician who was accustomed to handling such cases. With proper management of these severe cases it should be possible to allow any woman with cardiac disease to try to have a baby and to feel that the risk she took was not inordinately great. The exercise test should give one some degree of help in determining those who would go through safely, but their results in following the course of patients showed that it was not an infallible guide.

(To be continued.)

NEW YORK PSYCHIATRICAL SOCIETY.

Regular Meeting Held at the New York Academy of Medicine, December 7, 1921.

The President, Dr. THOMAS W. SALMON, in the Chair.

A Contribution to the Etiology of Feeblemindedness, with Special Reference to Enamel Defects.—This paper by Dr. L. PIERCE CLARK and Dr. CHARLES E. ATWOOD is published in this issue of the JOURNAL, page 573.

DISCUSSION.

Dr. CHARLES STOCKARD, in opening the discussion, said in effect that arrests in development of the embryo occurred at a critical moment in gestation. This critical moment corresponded to that of gravulation. Amniotic adhesions do not seem to be causal. Each organ has its own developmental dominant period. In experiments by Tandler of Vienna it was found that in twins comprising a male and female that the male testicle hormone of the calf affected the ovary of the female, arresting the ovarian development. The effect of vitamines must be considered of importance though as yet only partially worked out. A late opinion of some embryologists is that the skeleton is formed from the ectoderm. This has not been proved. In conclusion Dr. Stockard stated that in his opinion the experimental evidence is against the genetic origin of deviating types and in favor of accidental organic origin.

Dr. FRANKWOOD E. WILLIAMS, in his discussion, spoke of the importance of the subject on account of legislation being enacted from the viewpoint of the hereditary idea of origin.

Dr. FREDERICK TILNEY remarked that it was impossible to arrive at exact hereditary factors; that it was marvellous that the nervous system reached a normal development in any case. Endocrine factors must enter in. The embryo itself was a large gland of internal secretions. These endocrine organs, however, were not active until greater maturity.

Dr. CHARLES B. DAVENPORT wished to emphasize the fact that mental defect or feeblemindedness was not a biological concept, but a legal or social one. No doubt mentally defective children might arise from quite a number of unrelated causes. Goddard, in about seventy per cent. of feebleminded children, found evidence of a somewhat similar defect in close blood relatives. The speaker suggested another hypothesis of the origin of feeblemindedness which had not been sufficiently stressed. Studies made upon the uterus of pregnant pigs showed that only a certain proportion of the eggs that were ovulated developed to full term. Embryos died all along the line at various ages. Stillbirths which were found in pigs and sheep represented the embryos that died toward the end of the period. These earlier embryos were not miscarried immediately upon death; they were largely absorbed. Death seemed not due to faulty implantation—such a possibility hardly holds in the case of pigs and sheep. It seemed due to a lack of some of the developmental factors, probably of factors responsible for essential viscera. Just as many of the embryos that were started were incapable of complete development and thus died before birth, so others had only sufficient developmental impulse to carry them to the age of a few weeks after birth, or it may be to one, two, five or ten years. Thus we had the phenomenon of amaurotic family idiocy in which the child usually died before it was a year old. In the skeletal sphere we had the achondroplasias. Similarly we had certain muscular dystrophies. Inasmuch as these defects were not incompatible with life, the person might continue to live as a physical or mental defective, and was defective by virtue of the absence of the full equipment of developmental factors. These developmental factors that were lacking might be specific and unique, or there might be several of them.

If the defects were gross, as in many cases of infantilism, then, though the individual would survive, his defectiveness was eliminated in his strain as he was sterile. Thus a selective elimination of the physically and nervously incomplete was taking place from the moment of fertilization of the egg to maturity. In the case of those who were not so defective but what they could reproduce themselves, the developmental defects they showed were apt to be also shown in some of their descendants.

Letters to the Editors.

THE OLD AND THE NEW.

NEW YORK, *May 3, 1922.*

To the Editor:

In reading medical magazines, reports from the New York Academy of Medicine and papers read before national associations, the old practitioner finds there is little he really cares to read.

It is almost always detailed accounts of curious or rare cases, with the added refined laboratory findings. But to any further or better knowledge of how to treat ordinary diseases, it is woefully lacking. Is this desirable and a sign of true and real advance in medicine? I can not and do not believe it is. Above all, medicine should be a practical art, based upon long experience, knowledge, conscience, self-sacrifice. The science, socalled, varies much with every succeeding decade. Things and methods, which have been proven to be useful and, so far as possible, remedial in the special case, as manifested, and as like preceding ones as cases ever are in reality, should never be ignored or given up for what is merely the result of research work, usually of passing value.

Nearly all men who have studied and practised in large centres of population have had their apprenticeship in the use of mechanical instruments. And because these change and become more perfected they must never be allowed to take the far more important rôle of the instructed brain, which has dealt time and again with the advent, progress and outcome of many ailments and patients with them, through a score and more of almost continuous night and day watches.

I hope and pray, my juniors may wisely consider the foregoing brief remarks and have their conduct in the treatment of those who are ill, and frequently in pain, guided by them.

BEVERLEY ROBINSON, M. D.

NEW YORK MEDICAL JOURNAL
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NEW YORK, WEDNESDAY, MAY 17, 1922.

Miscellany.

A Review of Three Hundred Cases of Blood Chemistry.—Edward B. Bigelow (*Boston Medical and Surgical Journal,* May 5, 1921) concludes from a review of the blood chemistry in this series of three hundred patients that in general these examinations, whether they prove to be normal or abnormal, are functional tests of value in the fuller consideration of cases. Prognosis is extremely poor when there is a high retention of creatinine, and rather poor when a high urea retention. The determination of the alkali reserve is valuable in diabetes mellitus and to a lesser degree in nephritis. Repeated blood sugar determinations are invaluable as guides in the treatment of diabetes mellitus.

Arthritis.—R. Pemberton (*Military Surgeon,* December, 1921) summarizes that the conclusion can be justifiably emphasized, as revealed by observation and study in the United States forces, that arthritis presents a problem of military and social importance not hitherto appreciated. In view of the considerable data bearing upon this problem, failure to anticipate and provide for it in the event of another emergency would result in a largely avoidable and important reduction of military strength. A further result would be a long-continued after burden upon the civil community, to say nothing of the element of personal suffering entailed. It is suggested that the available data would form the basis of a skeleton plan of organization directed towards prevention of the disease, treatment of it and investigation of its nature. Consideration of treatment should include centres for this purpose, their location, equipment and personnel; and investigative effort should be on a scale commensurate with the increasing necessity for solving this problem and the unusual opportunities to this end created by war conditions.

Formation of Hemolysin Following Splenectomy.—St. Weiss and E. Stern (*Wiener klinische Wochenschrift,* February 9, 1922) report that in a series of experiments with injections of heterogeneous blood no difference was observed in the formation of hemolysin in the operated and control animals. The hemolysin content of the splenectomized animals was less than that of the control rabbits, and whereas the controls contained considerable amounts of hemolysin on the sixth day after the first injection, the hemolysin formation appeared in most of the cases only after the second injection in the splenectomized rabbits. The increase of the amount of hemolysin was similar in both. The spleen undoubtedly plays an important part in the formation of these antibodies.

Remarkable Course of a Tuberculous Spondylitis. — Hans Wimberger (*Wiener klinische Wochenschrift,* February 2, 1922) reports the case of a boy fourteen years old, who showed nothing unusual but an irregularly shaped outline in the region of the lumbar vertebræ and a poor general condition. The röntgenogram showed a calcified gravitation abscess in the region of the last thoracic vertebra which was markedly destroyed and of the two upper lumbar vertebræ. The two remarkable features of this case are the rarity of a röntgenogram of a calcified spondylitic gravitation abscess and a spondylitis with severe destruction of the thoracic and lumbar vertebræ, which were healed without any special deformities and without affecting the gait. A complete clinical cure resulted from heliotherapy.

Principles of Cancerous Disease.—Alexander Fraenkel (*Wiener klinische Wochenschrift,* February 2 and 9, 1922) asserts that every noxa may produce carcinoma to a greater or less degree, but not every part of the body is suitable for its development; both the exogenic and the endogenic factors deserve consideration. For some cases, as in branchiogenic tumors and nevus carcinomas, Cohnheim's embryonal theory is the proper explanation, and in others Fischer's theory, that the end of the development and loss of the embryonal power of development are not identical, holds good. The stimulation from abnormal growth attacks the cells directly or indirectly through the organism. In regard to heredity, neoplasms behave like malformations (Rössle), but statisticians are not convinced of the heredity of carcinomas: it seems that a certain predisposition for the origin of carcinoma is necessary and that this predisposition is favored by the complete behavior of the organism and can be hereditary; carcinoma, as such, is not hereditary. Where carcinomas occur in certain regions, parasites must be considered. Carcinomas do not occur in invertebrate animals; the human stomach, rectum and uterus frequently manifest them, whereas the duodenum and ileum rarely show them; herbivora show carcinomas most frequently in the respiratory tract. Some authors connect the functional activity up with the cancerous development, but this, just like the relationship between parasitism and the development of carcinoma, is only hypothetical. Investigations in immunity have up to the present time not solved the problem.

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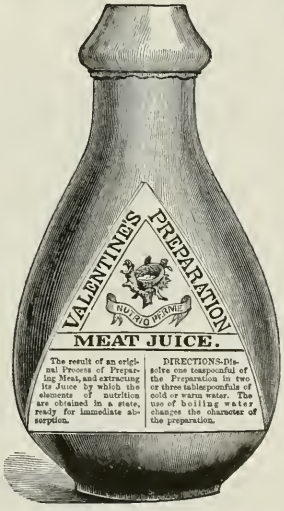
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Excretion of Dyes through Stomach and Bile.—Paul Saxl and D. Schert (*Wiener klinische Wochenschrift*, February 9, 1922) show that parenterally injected methylene blue is excreted not only by the bile but also very abundantly by the gastric juice. Gastric and duodenal ulcers often accelerate this dye excretion in the stomach, even when anacid. Anacids frequently have a tendency to excrete the dye very slowly, but even here there are exceptions.

Intoxications in the Pathogenesis of Endemic Cretinism.—A. Jona and A. Lusso (*Riforma Medica*, March 6, 1922) have found an evident connection between poverty and cretinism; further, they think that there is an unquestionable family decadence preceding the procreation of the cretin. There are three profoundly depressing influences on the individual and the race, namely, alcoholism, syphilis, and consanguineous marriages. Just as deficiency of essential food factors causes scurvy and pellagra; thus, by some unknown biochemical processes, analogous toxic causes probably, produce organic and functional derangements.

Clinical Blood Chemistry Tests.—J. O. Ritchey (*Journal of the Indiana State Medical Association*, April, 1921) asserts that blood chemistry is a valuable aid in diagnosis and prognosis, and in the management of patients, especially those with a diabetic or nephritic tendency. It is not the one test, but the correlation of a number which gives the most accurate information of a given condition. The methods of determination of the simpler substances are now reduced to practically microchemical analyses, and can easily be carried out in a well kept laboratory in a comparatively short time, and with only a few cubic centimetres of blood.

High Tracheotomy.—Chevalier Jackson (*Surgery, Gynecology and Obstetrics*, May, 1921) concludes as follows in speaking of high tracheotomy and other errors as the chief causes of chronic laryngeal stenosis:

1. The most frequent cause of chronic laryngeal stenosis is high tracheotomy.

2. While in a given case no one has any right to say that the operation that saved that patient's life was an unjustifiable one; yet, equally rapid methods being available, high tracheotomy should not be performed.

3. The classic distinction between a high and a low tracheotomy with reference to the isthmus of the thyroid gland is a relic of the days when too much respect was had for the thyroid gland, or at least for its isthmus, and the distinction should be abandoned. The vitally important matter of where the trachea should be incised should not depend upon the negligible isthmus. There should be taught only one tracheotomy and that should be low.

4. The trachea should always be incised lower than the first ring except in those rare cases in which laryngoptosis renders this impossible without entering the anterior mediastinum.

5. The cricoid cartilage should never be cut unless laryngoptosis places all the rings of the trachea below the upper border of the manubrium, which would require entering the mediastinum if the rule were to be followed.

6. The tracheotomic causes contributing to chronic laryngeal stenosis are: a. High tracheotomy; b, hasty operation; c, attempts at general anesthesia; d, cutting of the cricoid cartilage; e, hacking the trachea by several incisions instead of one; f, denuding the tracheal cartilages of perichondrium with resultant necrosis; g, suturing the wound; h, prolonged wearing of a cannula that is of improper size, shape, or material, such as rubber or aluminum, or one with a fenestra, or one without a pilot; i, neglect of proper aftercare. The keynote of the aftercare should be that it is a plumber's job; the "pipes," must at all times be kept clear.

7. If in an emergency a high incision of the trachea has been made, a cannula should not be worn in it. As soon as the patient's breathing has been resumed a low incision should be made and the cannula should be inserted therein.

8. Going deeper, the fundamental cause of so many cases of chronic laryngeal stenosis lies in the faulty teaching of surgical textbooks. The eminent surgeons who write textbooks would not do a tracheotomy through the larynx to avoid the isthmus of the thyroid, or because of haste; but eminent surgeons are not often at hand when emergency tracheotomies are required. These operations are usually postponed until respiration has ceased. If not already stopped the practitioner promptly stops it by attempting to give a general anesthetic.

Pyemia of Otitic Origin.—Horace Newhart (*Minnesota Medicine*, April 1, 1922) believes that pyemia having its origin in suppuration of the middle ear is more common than we have been accustomed to believe. The best results can only be obtained in making an early diagnosis, and here the chief aid is a blood culture. One or two negative blood cultures mean nothing, but a positive bacteremia, after excluding such conditions as acute tonsillitis, erysipelas, septic endocarditis and other infections, is almost indisputable proof of the existence of an otogenous pyemia, when there is present a mastoiditis or middle ear suppuration. In the preoperative era the mortality was over ninety per cent., and now the chances of recovery are in direct proportion to the timeliness of adequate surgical intervention. Alexander and Crockett in separate reports give a postoperative mortality of only sixteen per cent.

Erythropoietic Action of Germanium Dioxide.—Frederick S. Hammett, Joseph E. Nowrey, Jr., and John H. Müller (*Journal of Experimental Medicine*, February, 1922) report that germanium dioxide causes a very marked increase in the number of red cells to the c. cm. of the albino rat, the experimental animal employed. There was an increase in the red cell count of from one to five million cells. There was a tendency for the red cell count to increase most in those animals in which the original cell count was lowest. Small doses caused just as marked and significant a rise as did the larger ones. The effect seems to be quick in making its appearance, the rise in the red cell count occurring within a week and after two injections of the oxide. The authors believe that germanium dioxide is an erythrocytogenic agent, and hope for fruitful results from its therapeutic application.

To the Medical Profession:—

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For the milk-diet-only period, sweetened condensed milk, having retained the fat soluble A, and the water soluble B vitamins in almost their original potency, offers a complete milk food for the average normal bottle-fed infant. The timely use of fruit-juice as well as of cereal-jelly, and the proper method of preparing feedings, should be considered the same as with other modified milk feedings.

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Relation of Infantile Chorea and Epidemic Encephalitis.—G. A. Alfaro (*Semana Medica,* March 9, 1922) believes that certain cases of Sydenham's chorea are really a mild encephalitis which is predominantly in the corpus striatum. Of the infectious agents concerned, those of acute rheumatism take first place, followed in order of importance by many others, among them syphilis, which, however, is not one of major importance. Intense emotional disturbances may occasionally be causative factors.

Notes on Four Cases of Paroxysmal Tachycardia.—E. E. Laslett (*Quarterly Journal of Medicine,* October, 1921) describes four cases of paroxysmal tachycardia which are of different types, in three of which the paroxysms were apparently induced by excessive indulgence in tobacco. In two of the cases the paroxysms ceased when tobacco was given up or its use much limited. In the third case, the patient had been an extremely heavy smoker, but as he died during a paroxysm it was impossible to test the effect of its abstention. The fourth patient had had a prolonged attack of rheumatic fever, and also frequent attacks of rheumatism.

Alastrim.—W. C. Rucker (*Sanidad y Beneficencia,* Havana, December, 1921) states that from the public health point of view alastrim must always be diagnosed and treated as smallpox. The benign character of the periods of invasion and eruption, the lack or vagueness of umbilication of the lesions, and a total lack of destructive processes are distinctive of alastrim. However, there may occur simultaneously epidemics of true smallpox where atypical cases may cause great confusion and lead to serious consequences. Therefore the milder disease is better considered as a benign type of variola, and as a proof of their identity it has been shown that an attack of alastrim produces a complete immunity to vaccination with smallpox vaccine.

Rupture of Spleen.—G. P. Grigsby (*American Journal of Surgery,* November, 1921) says that the spleen is the most mysterious of all the ductless glands; its function and consequent value to the human organism have not been definitely established. Traumatic rupture of the spleen occurs with greater frequency than generally supposed; many fatalities in unoperated cases are doubtless correctly attributable thereto. The causative trauma may have been so slight as to produce no external evidence suggesting internal injury; yet the spleen may have been extensively damaged. The primary symptoms of splenic rupture may not be indicative of serious internal damage; the signs are usually delayed for several hours and then they progressively increase in severity. The preoperative diagnosis of traumatic rupture of the spleen cannot always be perfected; but following the infliction of trauma in this region the surgeon should consider the possibility of splenic damage especially where there is delay in development of symptoms. The treatment of ruptured spleen is distinctly and essentially surgical; medical management represents a delusion except insofar as it relates to the maintenance of physical resistance. To an experienced surgeon the technic of splenectomy is not so difficult as was formerly taught; the operation should be undertaken without hesitation when demanded by the conditions present; and the same rule holds true as applicable to traumatic lesions of other abdominal viscera, i. e., the earlier surgery is applied the greater the chance of a favorable outcome. The prognosis in ruptured spleen depends almost entirely upon the time intervening between infliction of the trauma and the institution of surgical treatment; fatality usually follows late operation after vital resistance has been greatly reduced by continued hemorrhage. Finally, the only hope of reducing the prevailing high mortality from splenectomy for traumatic rupture lies in earlier surgical treatment.

A New Obstetrical Procedure.—Lorenzo Diaz (*La Medicina Ibera,,* August 6, 1921) describes a method of replacing the absent amniotic fluid in dry labors by an artificial medium which renders much more favorable the infantile prognosis in these cases. Warm water in quantities up to 450 c. c. injected into the uterus in cases where there was a prolapse of a fetal part permitted of the performance of a version which would otherwise have been impossible.

Universal Intermittent Claudication Following Cardiac Hypoplasia.—A. Serko (*Wiener klinische Wochenschrift,* February 2, 1922) reports the case of a boy thirteen years old, in whom a marked hypoplasia was demonstrable, associated with a peculiar severe exhaustion after brief bodily exertion, especially in the lower extremities. After a short rest he recuperates more or less completely. There seems to be no doubt that the congenital stenosis of the vascular system, especially the cardiac hypoplasia, must be made responsible for the socalled universal intermittent claudication.

Gonorrheal Epididymitis.—C. D. Allen (*Military Surgeon,* October, 1921) advocates early epididymotomy for the following reasons: First, it shortens time of disability. Second, it gives complete relief from pain. Third, there is an immediate relief from toxemia. Fourth, there occur a minimum destruction of healthy tissues and a limitation of the disease process. Fifth, there is a total absence of recurrence. Sixth, the procedure is simple and quick, usually taking about five minutes after the patient is anesthetized.

Observations on the Percentage of Sugar in the Blood of Atrophic Infants.—R. A. Guy (*Quarterly Journal of Medicine,* October, 1921) determined the blood sugar of forty-three normal infants, finding the percentages to vary from 0.060 to 0.090 with an average of 0.068 in the group taken three to four hours after the last feeding. Thirty blood sugar determinations were made on eighteen different atrophic infants, and they were well within the normal limits, with the exception of six cases, not uncomplicated marasmus, in which the infants were vomiting on the day of analysis. In these the blood sugar was distinctly low. Guy draws the conclusion that within the limits observed, there is no relationship between the amount of sugar ingested and the percentage of sugar in the blood, whether determinations are made three to four hours, or at a shorter interval after the feed, nor is there a relationship between the percentage of sugar in the blood and the weight trend. The percentage of sugar as usually observed in the peripheral blood cannot be used as an indication of carbohydrate absorption.

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Herewith is a photograph of Page 95, Vol. II, "Diseases of Women," as edited by H. Marion-Sims, M. D., and in Dr. Sims' own words, is recorded the high esteem in which he held *Hayden's Viburnum Compound* and the "great service" rendered in treating

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DYSMENORRHŒA. 95

It has been long known that rest is most efficacious in relieving dysmenorrhœa. Some patients habitually go to bed during the menstrual process, finding so much relief from the position. There is nothing therefore new in the recommendation to rest at this time, but experience has shown that the positional treatment above described carries the effect still further. The treatment is particularly valuable in the case of young single women who are suffering from dysmenorrhœa not of such severe character as to render ioternal treatment imperatively necessary. And indeed I have in several cases employed positional treatment with great success where no examination at all had been made, but where the symptoms and general history conclusively showed that the patients were suffering from commencing uterine flexion.

Positional treatment is also very valuable as an adjunct in cases where internal mechanical apparatus are in use.

Palliative Measures.—Rest, the horizontal position, postural treatment, as above described, are all of first-rate importance. The warm hip-bath, temperature 100° or even higher, is to be recommended. Copious vaginal injections of hot water are sometimes found very serviceable. Ether, compound spirit of sulphuric ether, camphor, and henbane are ordinary and very useful remedies. Gin and water is a common domestic remedy. Poultices with laudanum sprinkled over them, hypodermic injections of morphia, turpentine stupes, are other remedies occasionally employed. Suppositories containing opium or morphia are very effective, but the use of opium is not advisable unless under strict medical orders. Chloral and bromide of potassium are good remedies. Guaiacum (Dewees), black hellebore (Meigs), have been strongly recommended. Colchicum, cannabis indica, and in fact every sedative and anti-spasmodic in the pharmacopœia, have been employed for the relief of the pain with more or less success.

[For severe dysmenorrhœa I have frequently found Hayden's viburnum compound of great service, given in teaspoonful doses every hour for three or four hours.]

During the menstrual period great care is required that the bowels be kept regular, that the digestive organs be in an easily working condition, and that food be adequate but not in too great quantity. It should be known that it is dangerous to use cold baths during menstruation.

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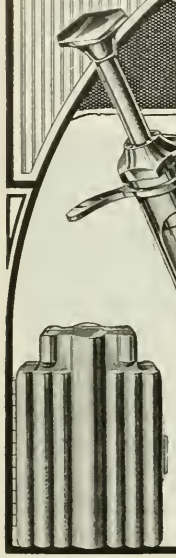

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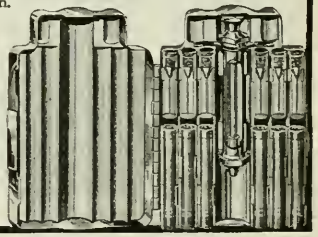

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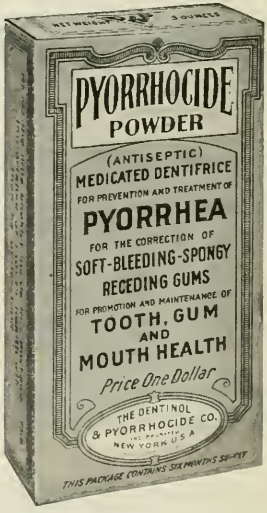

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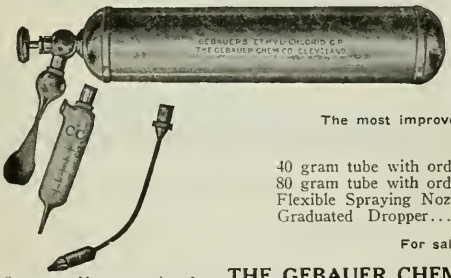

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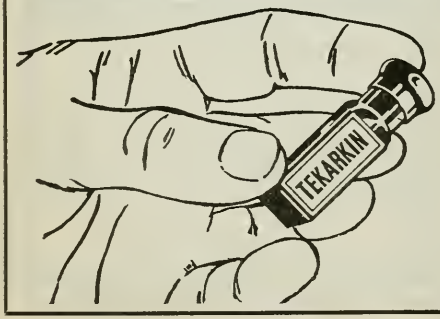

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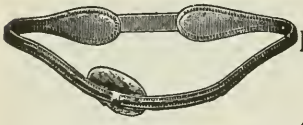

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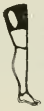

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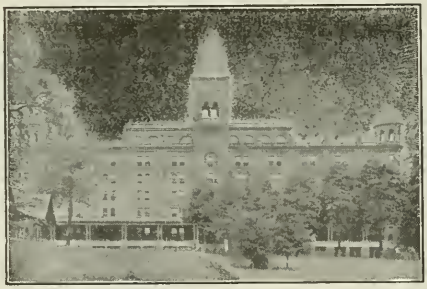

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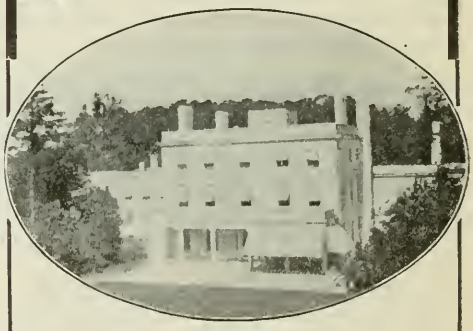

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